THE AEROPLANE and ASTRONAUTICS

MAY 1, 1959

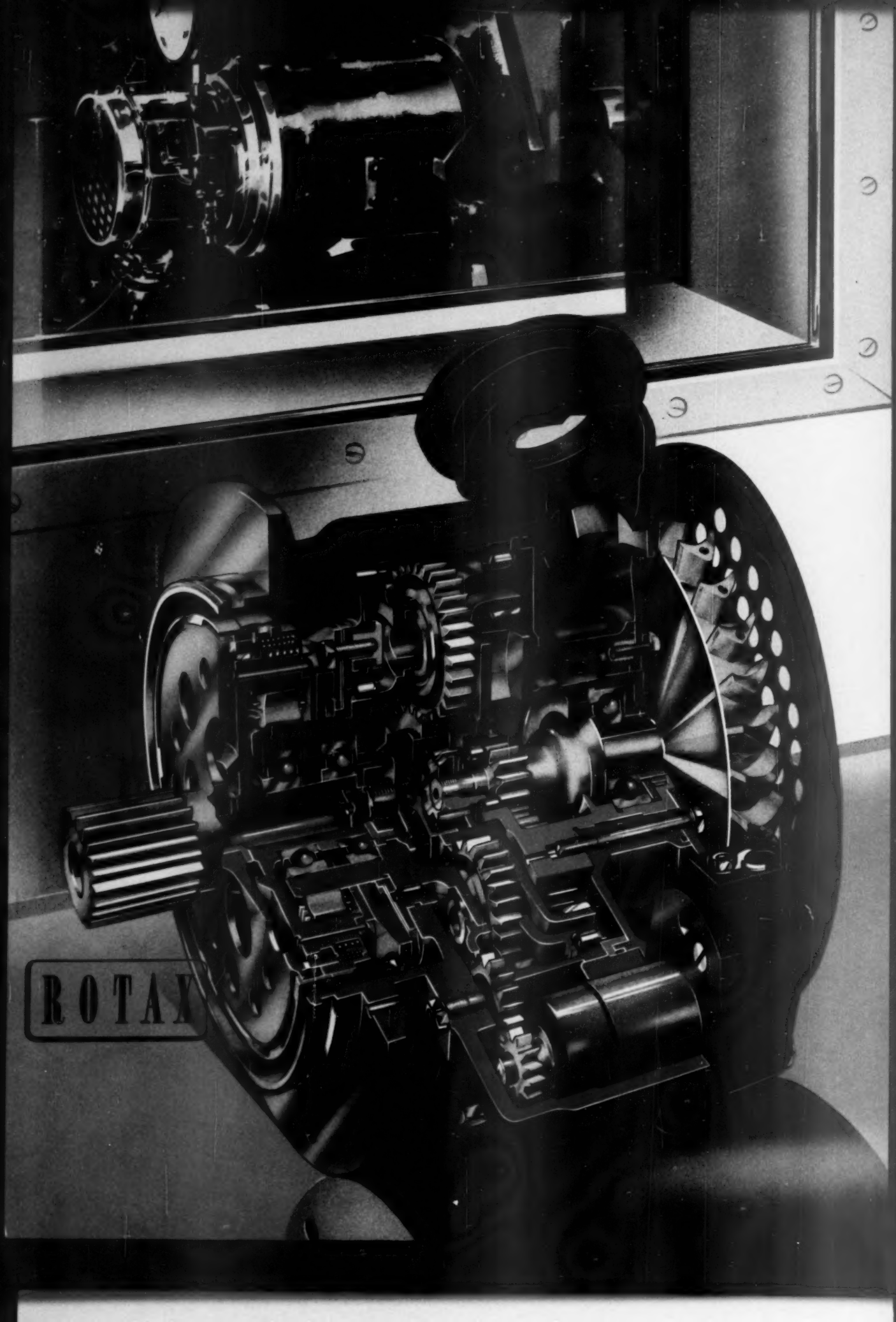
EVERY FRIDAY
ONE SHILLING
AND SIXPENCE

Before
the Vanguard
took shape

ROTAX

Vickers-Armstrongs (Aircraft) Ltd. talked to ROTAX about their complete Electrical, Generating and Starting Systems and about their servicing facilities in most parts of the world.

ROTAX LTD. ENGLAND, AUSTRALIA & CANADA


ROTAX

ROTAX—the only Pneumatic Starter in the world fully type-tested and approved by the M.O.S.

Pneumatics, as applied to engine starting, show many advantages to the aircraft constructor and operator. With intense research and development the full range of engines has been covered with our pneumatic starters; a number already having been type tested, Rotax lead the field.

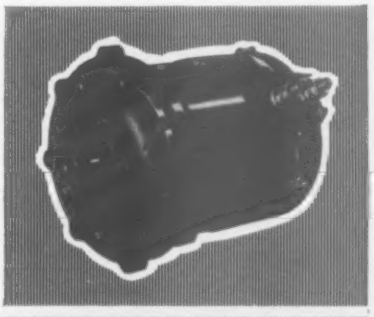
NOTE THESE ADVANTAGES OF ROTAX PNEUMATICS

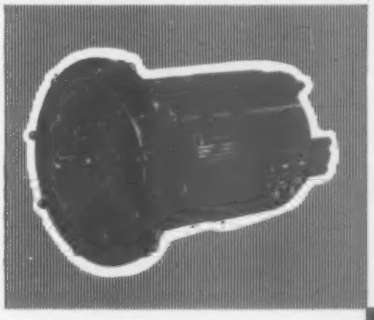
- *Simplicity.* Both in operation and maintenance.
- *High power to weight ratio.* Rotax engineering gives 70 b.h.p. for 20 lb. weight, *including reduction gears and engaging mechanism.*
- *Long Life.* Absolutely clean operation giving 1,000 starts without attention.
- *Versatility.* This type of starter can be used with aircraft A.P.U. or ground equipment, needs no special fuel or heavy current. Is designed to M.O.S specification.

Valves. Rotax engineers have developed a range of valves for use with their pneumatic starters in multi-engined applications.

Electric Starter. In applications calling for electric starters our knowledge, based on 22 years' experience in this field, is available to you.

For full details of the complete range of Starting Systems and how they can be designed for your specific requirements, please write or telephone Rotax.





THE FINEST AFTER-SALES SERVICE IN ITS FIELD

- Rotax Field Service Engineers available round the clock.
- Prompt on-the-spot diagnosis of trouble.
- Most parts of the world are covered by Rotax service.
- This After Sales Service is available to all users of our equipment.

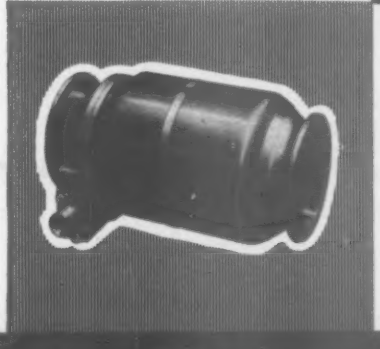
Rotax Complete Electrical and Starting Systems for your future designs

ROTAX

ROTAX LTD. WILLESDEN JUNCTION, LONDON, N.W.10 (ELGAR 7777)

LUCAS-ROTAX (AUSTRALIA) PTY. LTD., Melbourne & Sydney, Australia.

LUCAS-ROTAX LTD., Toronto, Montreal and Vancouver, Canada.



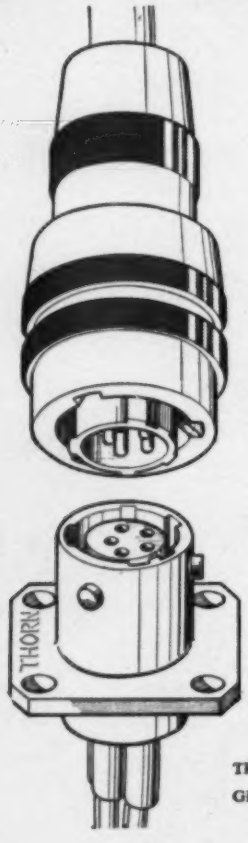
Thorn ELECTRICAL CONNECTORS

THORN AN SERIES

The Thorn AN series of electrical connectors includes solid shell/general purpose, pressurised and environmental resisting ranges. By specifying Thorn, designers are assured of a *genuine* AN connector for their installations . . . a connector designed strictly to the current MIL specifications.

Note these outstanding design and operating features.

- *Die-cast aluminium alloy shells cadmium plated for corrosion resistance.*
- *Resilient insert eliminates shrinkage problems and ensures superior electrical performance through high arc resistance, high dielectric strength and low moisture absorption.*
- *Thorn grommet increases flash-over and creepage distances, excludes dirt and moisture.*
- *Pressurised, water-tight, radio-quiet assembly.*
- *Maximum performance, minimum weight.*



THORN PYGMY PT SERIES

A new range of miniature connectors that satisfy the requirements of R.C.S. 321 (Category 40/100, class H.2 sealed items). Thorn Pygmy connectors are ideal for applications where space is limited and weight represents a critical factor of the installation.

- *Heavy gold plating over silver on all contacts.*
- *Performance unimpaired over a continuous temperature range from —40° to +100°C.*
- *Visual and audible inspection of coupling—perfect for "blind" locations.*
- *Three-point bayonet lock; perfect axial alignment of mating parts at all times.*
- *Five-key polarisation—positive protection against mis-mating or cross plugging.*
- *Miniaturised—light weight—compact.*

THORN ELECTRICAL INDUSTRIES LTD AIRCRAFT COMPONENTS AND CONNECTOR DIVISION
GREAT CAMBRIDGE ROAD ENFIELD MIDDLESEX TEL: ENFIELD 5353

N-156F DESIGN CONCEPT DELIVERS ECONOMY...MAXIMUM STRIKING POWER

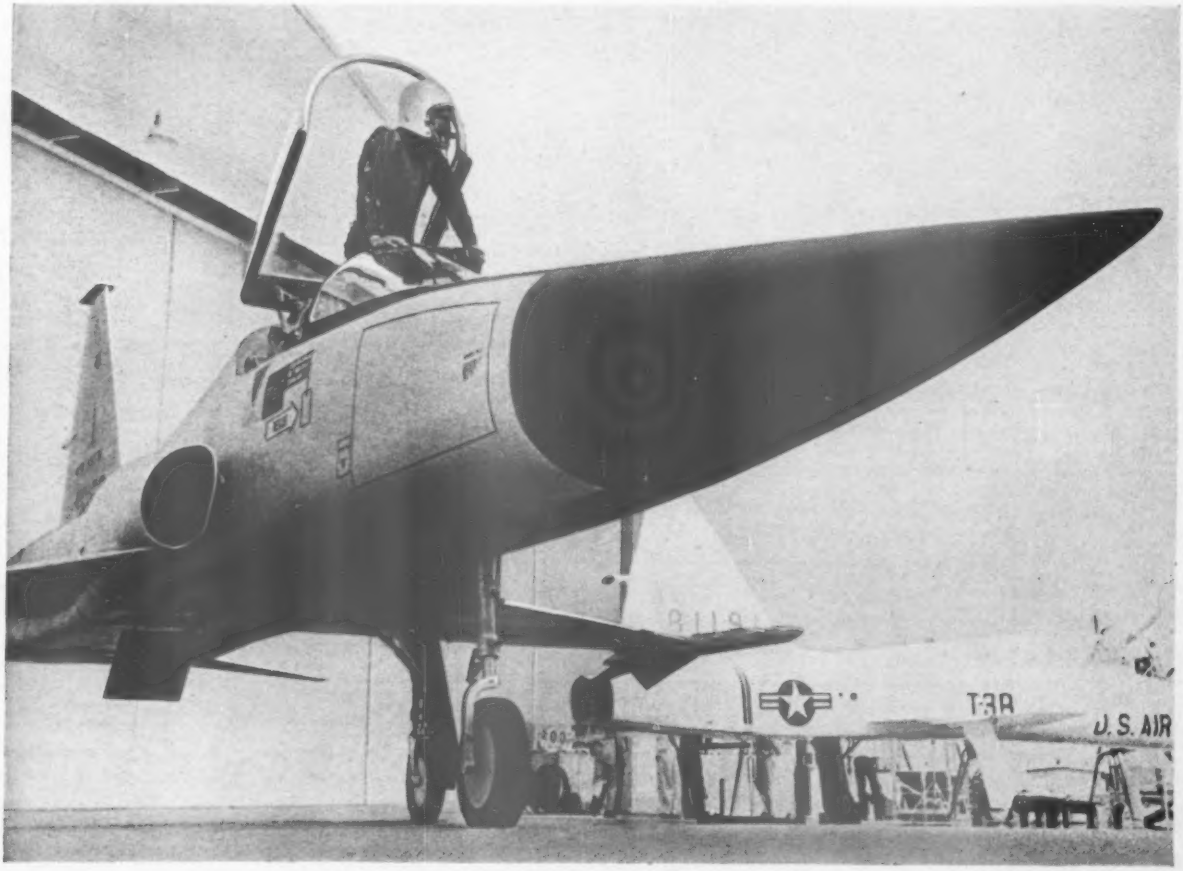
To deliver maximum fighting power within the available defense resources of the free-world nations, Northrop has developed the new, multi-purpose N-156F – the Freedom Fighter. The supersonic N-156F is lightweight, takes advantage of new high-thrust-to-weight jet engines and uses less than half the fuel of comparable U.S. fighters.

In addition, this fighter offers unique logistic and technical advances. The N-156F can operate from short airfields or be adapted for zero-length launch. This mobility contributes to quicker reactions. It permits more aircraft on ready alert along a wider and more dispersed perimeter for maximum striking power – with minimum vulnerability.

Northrop's N-156F has been selected for development by the U.S. Air Force. It is the first supersonic fighter American-designed for specific tactical and economic requirements of other free-world nations. Designed for production outside the United States, the N-156F will make a substantial contribution to the economies of the areas it is designed to defend. *First Freedom Fighter now being manufactured will be flight-tested this year.*

NORTHROP INTERNATIONAL

BEVERLY HILLS, CALIFORNIA, U.S.A.
A Division of Northrop Corporation



ELLIOTT

Leaders in the design, development and manufacture of lightweight radar equipment and navigational aids for aircraft installations where space, weight and power requirements are of primary importance.

— 21 SERIES —

VHF communications and VOR/ILS equipment

compact—lightweight—low power consumption

New design features, including the use of transistors and printed circuits resulting in an overall reduction in size and weight, *save at least 40 lb. per aircraft.* With a total weight of only 57 lb., *this installation is the lightest, most compact equipment of its type in production today.* A brilliant performance of 560 *channels* with 50 *kilocycle spacing* and the fact that down draught cooling is unnecessary, make this installation invaluable to modern airline operators and aircraft manufacturers.

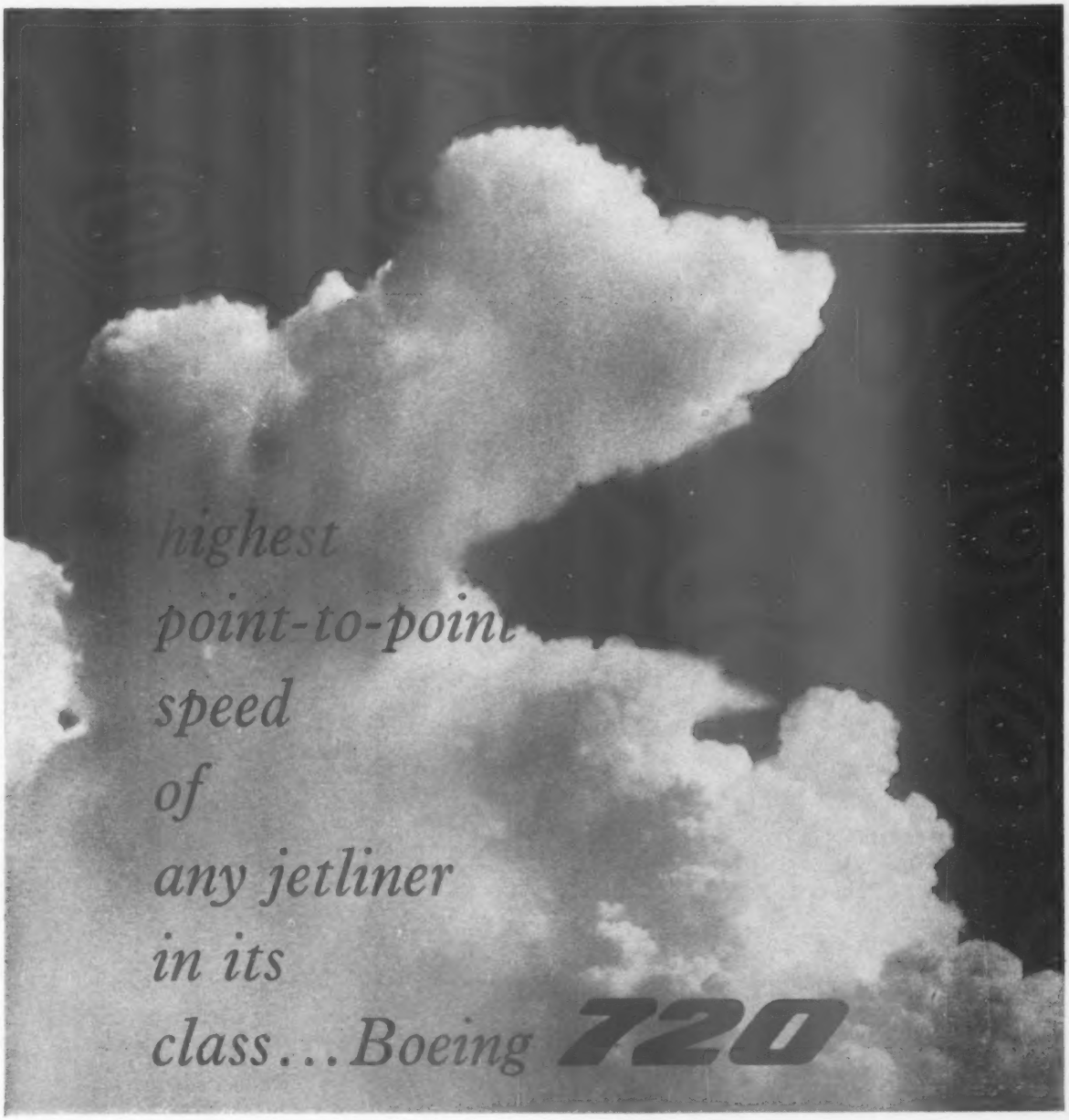
* *Made by Elliott Brothers (London) Ltd. under licence from the Bendix Aviation Corporation, U.S.A. All parts interchangeable with Bendix American manufactured Equipment*

Enquiries to:

ELLIOTT BROTHERS (LONDON) LTD

RADAR DIVISION

Elstree Way, Borehamwood, Herts. Telephone: Elstree 2040 EA *A Member of the Elliott-Automation Group*



The short-to-medium range Boeing 720 has a higher point-to-point speed than any other jetliner in its class. By increasing the angle of sweep-back of the inboard wing, Boeing stepped up the 720's cruise speed to 614 miles an hour, and its Mach limitation number to .90.

Sister ship of the CAA-certified 707, the 720 incorporates design advances based on a continuing prototype flight-test programme. The 720 incorporates, also, all of the advantages of the experience Boeing gained in building over 1600 large, multi-jet aircraft—more than any other company in the world.

These airlines have ordered Boeing 707 and 720 jetliners:

AIR FRANCE
AIR INDIA · AMERICAN
B.O.A.C. · BRANIFF · CONTINENTAL
CUBANA · IRISH · LUFTHANSA
PAN AMERICAN · QANTAS · SABENA
SOUTH AFRICAN · TWA
UNITED · VARIG · *Also* MATS

BOEING 720

A good start

IN 1909

Just 50 years ago Blackburn got off to a good start—using BTH magnetos. Today, the world-famous aircraft designed and produced by the Blackburn and General Aircraft Company get off to an even better start, equipped with the most modern BTH ignition systems. BTH are supplying electrical equipment for all Blackburn's latest projects.

B T-H

BRITISH THOMSON-HOUSTON

THE BRITISH THOMSON-HOUSTON CO LTD COVENTRY ENGLAND

an AEI Company A5386

Congratulations

TO THE

BLACKBURN & GENERAL AIRCRAFT COMPANY LIMITED

ON THEIR

50TH ANNIVERSARY

FROM

STERLING METALS LIMITED,
suppliers of castings to this famous company
for the past 40 years

SPECIALISTS IN ALUMINIUM AND ELEKTRON MAGNESIUM ALLOY CASTINGS FOR THE AIRCRAFT INDUSTRY

STERMET
REGD. TRADE MARK

STERLING METALS LIMITED
GIPSY LANE, NUNEATON

All over the world, Sikorsky helicopters have rescued more people than all other helicopters combined.

(and carried more passengers and cargo, too)

SIKORSKY AIRCRAFT, Stratford, Connecticut, U.S.A.

Sole foreign representative: United Aircraft Export Corporation, East Hartford, Conn., U.S.A.

European Offices: 3/5 Warwick House Street, London, SW1 England

Hearty Congratulations to

BLACKBURN AIRCRAFT LTD

ON THE ATTAINMENT OF THEIR

Golden Jubilee

THE NEW BLACKBURN A129

Photograph by kind consent of BLACKBURN ENGINES LTD. Brough, E. Yorks.

WE ARE HAPPY AND PROUD TO HAVE BEEN ASSOCIATED WITH THEM FOR SO LONG IN THEIR MANY ENTERPRIZES, INCLUDING FOR **BLACKBURN ENGINES LTD.**

THE **PALOUSTE**
ARTOUSTE
TURMO

AND **NOW** THEIR LATEST PRODUCT—THE PROMISING **A129**—FOR ALL OF WHICH WE HAVE MANUFACTURED SO MANY PRECISE COMPONENTS

HULL GAUGE & TOOL CO., LTD. BEVERLEY ROAD, HULL TEL. 36134

BLACKBURN AND GENERAL AIRCRAFT LTD.

50TH ANNIVERSARY

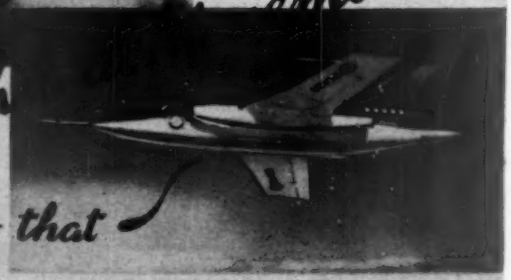
From this

Congratulations —

"We are proud

of our

with th



To that

The Hughes-Johnson Stampings Ltd
Langley Green, Birmingham

Light Metal Forgings Ltd
Oldbury - Birmingham

FERRANTI LTD

Congratulations to

BLACKBURN & GENERAL AIRCRAFT LTD

on the occasion of their

50th ANNIVERSARY

Radar and Artificial Horizon Equipment
designed and developed by Ferranti Ltd.
is fitted to the Blackburn NA39 strike aircraft.

FERRANTI LTD · FERRY ROAD · EDINBURGH 5 · SCOTLAND
AIRCRAFT EQUIPMENT DEPT · MOSTON · MANCHESTER 10
OR
WESTWICK · BRACKNELL · BERKSHIRE

FG284

B

FOR EXTREME CONTROL SENSITIVITY

the Blackburn N.A.39 relies upon cable tension regulators in the primary flight control systems

TELEFLEX

Tension Regulators are specified for practically all the latest British Aircraft

TELEFLEX PRODUCTS LTD.

BASILDON · ESSEX · *Telephone: BASILDON 22861*

P 3565

Congratulations

to

BLACKBURN

Aircraft Ltd.

on their **50th Anniversary**

We are happy to extend our congratulations to Blackburn Aircraft Ltd. on their record of 50 years of pioneering and achievement in the aircraft industry.

Hendrey Relays

Suppliers of Aircraft Relays to Blackburn Aircraft Ltd. and other leading aircraft manufacturers.

HENDREY RELAYS LTD.
Bath Road, Slough, Bucks.
Telephone: Burnham 609/611

Congratulations to Blackburn & General Aircraft Limited on their 50th Anniversary

from

Thermo Plastics Ltd

DUNSTABLE - BEDFORDSHIRE

A Member of the Tootal Group

Moulders and Fabricators of Canopies, Radomes, Fairings, Windows etc.

developments in flight equipment...

Congratulations to
Blackburn & General Aircraft Limited
on their 50 years of aviation success

195

HOT AIR REDUCING VALVES

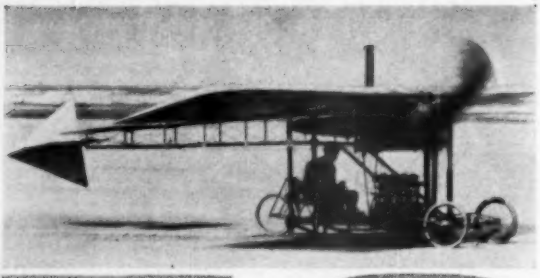
The Hymatic range of reducing valves for the precise pressure control of engine tapped air is further extended by the PS60 series. Used for fuel transfer, fuel system and recuperator pressurisation, hydraulic reservoir pressurisation and ventilated suit systems, the PS60 may include an integral relief valve and control in relation to absolute, ambient or other variable datum pressure. The PS60 with integral relief valve weighs 1.3 lb., and without relief valve 0.8 lb. It will accept air up to 175 p.s.i. and 300°C., and very closely control the outlet pressure at any flow up to 25 c.f.m.

Hymatic, as leading engineers in the Aircraft equipment field, have been responsible for the design and precision manufacturing of many products including:

High pressure compressors
Cartridge operated valves
Ground charging valves
Automatic regulator valves
Anti-g valves
High flow reducing valves
High pressure reducing valves

...by **Hymatic**

THE HYMATIC ENGINEERING COMPANY LIMITED · REDDITCH · WORCESTERSHIRE



50

50 years of experience are behind the Blackburn NA.39

1909 Robert Blackburn designed, built and flew his first aircraft at Marske Sands in Yorkshire.

1959 Latest of a long line, the Blackburn NA.39 Strike Aircraft, which first flew on its target date in April, 1958, is now in production. Of this aircraft the Ministry of Defence has stated: "In the low-level strike role, the NA.39 is ahead of any aircraft in the world"

BLACKBURN AIRCRAFT LIMITED, BROUGH, YORKSHIRE.

A128/a

THE AEROPLANE and ASTRONAUTICS

VOLUME 96 NUMBER 2487 MAY 1, 1959

The Dangerous Route

At the time of going to press there was still no news of the Air Charter Super Trader (Tudor) which disappeared on April 23 on the Ankara-Bahrein sector during a flight from London to Australia with equipment for the Woomera rocket range.

Whatever may be the outcome of the search which was still proceeding last Monday the cause of the loss may well have to be put down to the extreme difficulty of the route which, for political and other reasons, had to be flown by the crew of the Tudor. This route—over the south-east corner of Turkey near Russian Armenia and along the Persian side of the Iraq border to the Persian Gulf—is not only sparsely equipped with aids (to put it at its best), and these only of the non-directional beacon type, but is virtually without useful landmarks or township lights at night and topographically is very dangerous country.

This Tudor tragedy—if tragedy it turns out to be—points once again to the need for really long-range aircraft to be used for work of this kind so that other routes can be used while there are so many political difficulties in the Middle East areas.

A New Cadman Committee?

In the course of his recent address to the Derby Branch of the R.Ae.S. Mr. Edward Bowyer, director of the S.B.A.C., devoted some attention to the prospects of a substantial decline in export business, which, he declared, it would be prudent to face. He had pointed out that, since the War, the industry's export business, with one dip around 1954, has gone on increasing, and in 1958 was some ten times the money value of exports in 1946.

January this year, at more than £13 million, clocked the highest January figure yet known. This export achievement represented, he went on, the fruits of research and development of aircraft, aero-engines and equipment begun several years ago, and done almost entirely on military votes. Moreover, even last year the export of military aircraft still represented a substantial proportion—not less than 40%—of the total aviation export trade, and this part of the business cannot be expected to continue at these levels, even though that wonderful aeroplane, the Hunter—with the Viscount the most successful British aeroplane in the export markets—still has a good many millions of overseas contracts to fulfil.

Add to this inevitable decline in the sale of military aeroplanes, the increasing competition in the sale of civil aircraft abroad, and the way the civil market is closing up because the airlines have overbought aeroplanes for which many of them are going to find it difficult to pay, and it is indeed prudent, declared Mr. Bowyer, to face the prospects of a substantial decline in export business.

At Southampton even more recently, as we pointed out last week, Mr. Peter Masefield, speaking to the Institution of Production Engineers, declared that if this country were to decide to build a supersonic airliner, we had to face the fact that in whatever category the supersonic airliner was built it was likely to have to compete with a Mach 3 machine built by the U.S. industry. And to spend more than a

Editor - - - THURSTAN JAMES
Deputy Editor - - F. T. MEACOCK

Founder Editor (1911-1939) *C. G. Grey*

Proprietors: TEMPLE PRESS LIMITED
Chairman and Managing Director:
ROLAND E. DANGERFIELD

Editorial, Advertisement and Publishing Offices:
BOWLING GREEN LANE, LONDON, E.C.1.

Telephone: TERminus 3636
Telegrams: "Pressimus London Telex"
Telex: 23839

Annual Subscription Rate: United Kingdom £4 15 0.
Overseas £5. Canada and U.S.A. $15.00

© Temple Press Limited, 1959. The proprietors will consider any written requests to reproduce articles and illustrations appearing in this ournal. Comment and brief extracts which acknowledge *The Aeroplane and Astronautics* are permissible.

hundred million pounds in developing a supersonic machine doomed to be outclassed was something this country could not possibly afford. He suggested that a worth-while alternative might be to spend money on developing a low-fare transport making use of the most modern techniques.

Now it seems to us that Mr. Bowyer's warning about the decline in exports to be expected as the result of the cut in military orders and reduction in research work coupled with Mr. Masefield's warning against dissipating public money on a supersonic airliner which could not be competitive, combine to emphasize the need for a new policy towards the future of British aeronautics. Mr. Masefield reminded his audience that the report of the Cadman Committee in 1938 contained a recommendation that would stand for today:—

"It is essential," so ran the recommendation, "to formulate a specific programme of development which will ensure that the British operating companies are at all times using aircraft that are in the van of aeronautical progress." With that recommendation few people in the aircraft industry today would grumble. It is a shock to learn that words so timely and so in accord with the situation today were, in fact, part of a report written over twenty years ago. It went on to advise that the Government of the day should form an advisory panel to plan developments.

In the space of his paper which was full of fascinating figures regarding the cost of development of modern aeroplanes there could be no room for a discussion of the part which the United Kingdom, with the Commonwealth, may be expected to play in the developing field of astronautics yet we suspect that this question is fraught with just as much significance for the engineering future of this country as the question of whether or not to build a supersonic transport.

If we are not prepared to press on with research in all the fields necessary to achieve supersonic flight should we not turn to the research and development needed to build space vehicles and in particular satellites, bearing in mind the importance that these will so soon take in military affairs?

And to settle the matter what better than a new Cadman Committee!

ROYAL VISITOR.—During her recent tour of Stevenage New Town, Her Majesty The Queen visited English Electric Aviation's factory there and saw Thunderbird guided weapons and their equipment. Her Majesty is here escorted by Mr. H. G. Nelson, the company's chairman and managing director.

Consolidation in Europe?

Last week-end the presidents and other top executives of the five "Europair" carriers were meeting at The Hague for what is generally understood to be their fourth conference. Other meetings have been held in Brussels, in Paris and, early last month, in Rome.

Nothing concrete has been divulged about the way in which these president-level meetings have been progressing, though a short and uninforming statement was issued after the Rome conference. So far the reports and comments about the discussions have been based almost entirely on hearsay and logical deductions.

There does not appear to be much doubt, however, that the five national airlines concerned—Air France, K.L.M., Sabena, Lufthansa and Alitalia—have been trying to find acceptable means by which their operations can be mutually rationalized for increased efficiency and in common defence against competing carriers.

The first object of the carriers would, presumably, be to find a means of apportioning capacity and traffic so that the most effective overall airline system could be evolved—and the first area to be tackled might well be the North Atlantic. The five European carriers all have long-haul turbojets on order and they are likely to want to rationalize their operations so as to improve economics and to put up the most effective competition.

All this may reasonably be looked at against a background of disputation about the traffic rights of American carriers in Europe and of European carriers in the U.S.A. While the American carriers are complaining about the infiltrations of other operators into their territory the European carriers have for long felt that they get too little in return for the considerable rights enjoyed by P.A.A. and T.W.A. in Europe. The U.S. answer to this has always been one to the effect that a large percentage of Atlantic traffic originates in North America.

Whatever may be the just view of this controversy the fact remains that a strong consortium of European carriers would obviously be in a better position than the individual operators to fight successfully for more gateway rights in North America —using, as a lever, the threat of the refusal of some of the existing U.S. traffic rights in Europe.

It can be assumed that similar discussions will be proceeding in relation to the tidying up of the intra-European service pattern and to the means by which engineering facilities may be shared and common types of aircraft selected.

Meanwhile, the major airlines outside Europair—notably B.E.A., S.A.S. and Swissair—will not have been inactive in considering possible encircling moves. S.A.S. and Swissair, in any case, had already agreed on an aircraft fleet utilization and engineering rationalization.

The difficulties facing the Europair concept are immense and it may well be that the final form of the co-operation and co-ordination will be limited in scope, but there are good economic reasons for making as much of a success of it as possible—and equally good reasons for disquiet among other European and long-haul U.S. carriers.

The First Swallow

Westlands have never claimed that their new Heliport on the south bank of the River Thames at Battersea is anything but an experiment and a temporary measure. However, as a piece of aeronautical private venturing it merits special notice.

Its facilities were noted and appreciated by the distinguished guests present at the official opening ceremony on April 23. But for anyone who might be led to suppose that the event was a sort of curtain raiser to immediate universal rotary-wing travel to and from the near-heart of London, the Joint Parliamentary Secretary to the Ministry of Transport and Civil Aviation made it plain that this is far from being the case. A great many "complicated and difficult" problems, said Mr. Hay, have to be solved before there can be regular helicopter services between important centres of population in this country.

For the future, Mr. Hay explained that the Ministry were giving a great deal of thought to the eventual provision of one, or perhaps several, helicopter stations to serve central London, when there were prospects of the full commercial possibilities of helicopter services being realized.

In declaring the Heliport open, Mr. Hay asserted that it would play a very useful part in catering for the specialized work for which helicopters are already suitable. And, he added, it would give many pointers to their expanding future.

These pointers have, in fact, been visible for some considerable time. They have not gone unnoticed by the industry who can always produce what the customer wants if he states his requirements clearly enough and in time. What is needed now is more energetic forward planning and co-ordination on the part of the Ministry departments concerned with supply and operation.

Matters of Moment

Orpheus Production in Germany

FOLLOWING the German Federal Government's decision to build the Italian Fiat G.91 standard NATO lightweight fighter in Germany, an agreement was signed in Coblenz on April 22 for the Bristol Siddeley Orpheus 803, which powers it, also to be made under licence in Germany.

Unconfirmed reports suggest that the contract is worth £434,000. The manufacturing concern has not yet been named. There is to be no limitation to production, but exports by Germany will not be permitted.

The Orpheus 803, rated at 5,000-lb. thrust, is now specified as the powerplant for 14 different types of aircraft, including those of Britain, France, the U.S.A., Japan and Italy. Licence agreements have been signed for its manufacture in France, Italy and India.

Honoured by Italy

MR. R. E. HARDINGHAM, C.M.G., O.B.E., F.R.Ae.S., secretary and chief executive of the Air Registration Board, was honoured last month by the Italian Government with the award of the Insignia of the Cavaliere Ordine Merito Repubblica Italiana. He received his decoration from His Excellency the Hon. Giovanni Bovetti at a reception in Rome on April 8 at the Casa dell'Aviatore.

At the ceremony, appreciation for the understanding and close friendship that exists between the Air Registration Board and their Italian counterpart, the Registro Aeronautico Italiano, was expressed by His Excellency and by Gen. Felice Porro, president of the R.A.I. And they both emphasized the importance of co-operation between the airworthiness authorities of our two countries.

Malcolm Clubs Appeal

FOLLOWING the recent reprieve of the Malcolm Clubs by the Air Ministry, an appeal has been launched to raise the sum of £95,000, which is estimated to be the working capital necessary to ensure the continued existence of the clubs. This amount is required to meet the deficiency of liquid resources; improve existing equipment and acquire new; allow the opening of new clubs; provide a reserve flexible enough to meet emergencies; and cover such other objects within the Malcolm Clubs Trust Fund as the trustees may decide.

The appeal was launched by Marshal of the R.A.F. Lord Tedder, the founder and president, three days after the announcement in the Commons by the Secretary of State for Air that a financial settlement had been reached between the clubs and the Air Ministry. He was supported by Lord Balfour of Inchrye, chairman of the Appeals Committee, Lady Tedder and Mrs. K. Malcolm, mother of the first R.A.F. V.C. of the North African campaign, the late Wg. Cdr. H. Malcolm, after whom the clubs were named.

Lord Balfour pointed out that the Malcolm Clubs had never before appealed for funds, and in his history of the clubs Lord Tedder emphasizes that they are something different. They have given, and are giving, a vital human service. "They have become part of the life and history of the R.A.F. overseas. They are the airmens' own clubs. The airmen have taken the initiative in starting amongst themselves what they call 'fighting funds' for their Malcolm Clubs. I believe that in asking for support I am speaking for thousands of men and women in the Service—and also for many who have returned to civil life."

The Junior Officers Club is to be opened again in London and the furniture trade has offered to furnish it free. It will provide junior R.A.F. officers with accommodation in London whether they are on duty or leave. A section called the "Friends of the Malcolm Clubs" has been formed, with a minimum subscription of 2s. 6d., entitling members to wear a lapel badge.

Lasham's International Glider Trade Fair

NOW that British sailplane manufacturers have their order books well filled, for home and export deliveries, there is likely to be some competition from imported sailplanes. An agent has been appointed in the United Kingdom for Polish sailplanes, and one design of that origin—the well-known Jaskolka—will be seen at the Glider Trade Fair organized by the British Gliding Association at Lasham for the first two days (May 9 and 10) of the National Championships.

The Jaskolka is to be flown in the Championships by Mr. J. R. Jeffries (London Gliding Club) who, representing Moto-Import, will also demonstrate the aircraft with a view to selling it. Another of this type has been bought by Mr. L. M. Mackie in Northern Ireland.

The French Breguet company, too, is export-conscious, and has lent a Fauvette sailplane to Cdr. A. Goodhart. He will fly it in the Championships, and Breguet will provide a crew for him.

In addition to the many British concerns at the Glider Trade Fair which will exhibit aircraft, oxygen equipment, fabrics, paints, instruments, lifting gear, thermal indicators, safety devices, barographs and other allied equipment, a Swiss firm is also to show its products.

Aslib Aeronautical Group

LIBRARIANS and information officers from the aircraft and guided weapon industry and the Ministry of Supply attended the eighth annual conference of the Aslib Aeronautical Group at Cranfield during the week-end of April 3-5.

The first day of the conference was devoted to the discussion and amendment of a paper, "Technical Information in the Aircraft and Guided Weapon Industry," which had been prepared by the Group's Committee. On the following day, Mr. J. E. Allen of the Weapons Research Division of A. V. Roe and Co., Ltd., outlined the technical background of the guided weapon industry after which Mr. R. Wall described the Division's library and information service.

Finally, there were papers from two members of the R.A.E., Mr. R. A. Fairthorne and Mr. R. C. Wright, who had both attended the International Conference on Scientific Information held in Washington last autumn.

HANDSOME PAIR.—R.M.A. "Vanguard," flagship of the B.E.A. Vanguard fleet, made its first flight on April 22 and has now joined the first Vickers Vanguard at Wisley. The burden of obtaining the full airworthiness certification by March, 1960, falls upon these two aircraft and the next three to come from the production line.

Photograph copyright "The Aeroplane and Astronautics"

Light Aircraft on Show

IN addition to the organizers themselves, nearly all the exhibitors at the second sales week-end of light aircraft held by W. S. Shackleton, Ltd., at Kidlington, from April 24 to 26, reported intense interest by prospective customers as well as several on-the-spot firm orders. Although the weather did its best to mar the event on Saturday, the Shackleton sales week-end is now an established success, and is likely to become the annual "Farnborough" of the lightplane world.

It differs in one respect in having a more international flavour, and the 20 or so current production aircraft on display included types from Belgium, Czechoslovakia, France, Italy, Sweden and the United States, in addition to the United Kingdom. There was also no set flying programme, but demonstration flights took place almost continually for potential purchasers, who were able to sample a wide and delectable range of light aeroplanes.

These included some of the latest American types, among which the Piper machines held pride of place. Irish Air Charter, Ltd., the U.K. distributors, displayed all the current range of Piper products, comprising the Apache, Comanche, PA-18A and Tri-Pacer in an imaginative "Piperama" setting of a flag-bedecked enclosure. The sleek Comanche, displayed for the first time in this country, attracted particular attention, and another newcomer, from Belgium, was the diminutive Tipsy Nipper. Bernard Neffs, Avions Fairey test pilot, put up a remarkable show in this Volkswagen-powered ultra light, performing a full range of aerobatics in the most violent weather conditions.

An Aviation Traders Prentice snatched a banner reading "Fly Channel Air Bridge," while another displayed its capability as a six-seat tourer for Maitland Air Charter.

Other impressive flight demonstrations were made by a Prestwick Pioneer and a D.H. Heron, while for the less-ambitious private owner there was a choice of some 40 used light aircraft.

Sperry's New Factory

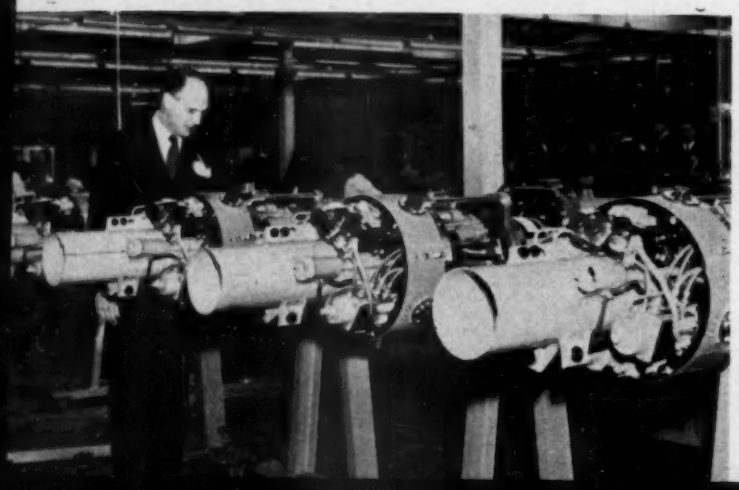
AT the S.B.A.C. Display last year, an indication was given of the important part the Sperry company was playing in Britain's guided weapons development. It had been known for some time that the company had been responsible for the control system for the Armstrong Whitworth Seaslug surface-to-air weapon for the Royal Navy. At Farnborough, part of the equipment was actually on show and included some imposing shipboard test consoles.

Last week, this important activity came into the news again, when the Minister of Supply officially opened the new Sperry factory at Bracknell in Berkshire. As this section of the Sperry organization is almost entirely occupied with research, development and manufacture of guided weapons equipment—principally the control system for Seaslug and the internal guidance system for the de Havilland Blue Streak ballistic missile—the security arrangements did not permit us to see more than a small part of the facilities. However brief and restricted our tour was, though, it was enough to show that, at Bracknell, the Sperry team have a first-class factory laid out on "contemporary" lines and set in a very pleasant part of the country.

In his speech at the opening ceremony, Mr. Aubrey Jones referred to current emphasis on quality rather than quantity in the weapons field. This, he asserted, implies greater emphasis on research and development than on production and he underlined the importance to the country of R and D work. He spoke of Sperry's contribution as a pioneer in the art of precision engineering.

The Minister was thanked by Mr. R. Broadbent, the company's managing director. He described the provision of the new factory as a combined operation between the company, the Bracknell Development Corporation and the Ministry of Supply.

Certainly all three can congratulate themselves on having such a first-rate home for a vital section of Britain's guided weapons industry.



Photographs copyright "The Aeroplane and Astronautics"

MINISTERIAL INTEREST.—Left, the Minister of Supply, Mr. Aubrey Jones, inspects Seaslug control assemblies during his tour of the new Sperry factory at Bracknell which he opened on April 24. Above, Mr. J. Hay, parliamentary secretary to M.T.C.A., climbs aboard a Widgeon after opening Westland's London Heliport on April 23 while Mr. Eric Mensforth (middle) and Mr. E. C. Wheeldon (right, back) and the Mayor of Battersea stand by.

New Views of the Navy's Newest

Above, from left to right, are the first, second and fifth pre-production Blackburn NA.39 naval strike aircraft (two D.H. Gyron Junior turbojets). It can be noted that the tail braking device is subject to variation in design.

All five aircraft which have now flown are illustrated on this page; another five or more should fly by the end of the year.

Right and below right are the third and fourth aircraft, respectively. Like the fifth, they have Royal Navy dark grey and white finish: the others retain their "display" colouring.

The removed inspection panels (seen right, lower) indicate that control lines run along the dorsal fairing.

An account of the Blackburn company's 50 years' activities is on pp. 518—521.

Air Transport

The Pacific Controversy

THE situation over B.O.A.C.'s traffic rights at Tokyo may well be somewhat clarified by the time this issue appears. New arguments in the case were due to be heard by the Civil Aeronautics Board last Tuesday after the examiner (see last week's issue, p.494) had recommended the rejection of the Corporation's application on the grounds that the permit would be contrary to U.S. public interest.

During the previous week the C.A.B. had ruled that Tokyo had been properly added to B.O.A.C.'s trans-Pacific route under the provisions of a 1946 bilateral air transport agreement between the United States and Britain.

As we explained in an earlier issue, the 1946 agreement covered a service between San Francisco and Hong Kong, though a paragraph (4B) provided for the addition of other stops. In 1947 the U.S.A. added Tokyo, and Pan American have since been operating through this point.

In 1956 the U.K. and the U.S.A. agreed that this "writing-in" procedure should be discontinued in the case of "significant" traffic points. As, however, the U.S.A. had already used this procedure it was agreed that the U.K. could do the same. Early in 1957 Tokyo was added to the agreement and in October, 1958, B.O.A.C., as the approved U.K. carrier, applied for a permit from the C.A.B. to operate the service.

Northwest Airlines' objection, to the effect that the 4B procedure had been misapplied in the case of B.O.A.C.'s use of Tokyo, was overruled by the C.A.B., but the examiner has now agreed that an outstanding objection—to the effect that the Corporation's service would be contrary to U.S. public interest—is a valid one.

European Traffic, 1958

FIGURES published by the Air Research Bureau show that passenger traffic in Europe increased by 9% in 1958 compared with 1957. The figures are based on the results of the airlines which are members of the A.R.B.—Aer Lingus, Air France, Alitalia, B.E.A., Finnair, Iberia, Icelandair, K.L.M., Lufthansa, S.A.S., Sabena and Swissair—and are for intra-European traffic only. The growth rate of 9% is lower than in previous years but compares favourably with the World average of only 5%.

Other points from the A.R.B. report are that first-class traffic increased by 25% but still represents only 7.5% of the total passenger traffic; and freight ton-kilometres increased by 10% compared with a World increase of 1%.

Fifth-year Profit for B.E.A.

DESPITE the serious world-wide recession in air traffic in 1958, British European Airways made a small profit, according to preliminary estimates. This is a "real" profit, after allowing for payment of all interest charges, and makes 1958-59 B.E.A.'s fifth profitable year in succession.

During the year, the Corporation increased its output by 13%, but traffic increased by only 7.2%, so that the overall revenue load-factor fell by 5.2% to 60.4%. The fact that Easter this year was early enough to fall in the 1958-59 financial year helped towards the successful result, traffic over the holiday week-end breaking all previous records. On the other hand, the persistent fogs between December and March aggravated the already difficult situation.

Traffic and staff figures for 1958-59 are tabulated below. Results for March show that the recent recovery in traffic continues. Load ton-miles increased by 25.7% compared with March, 1958, and as capacity offered went up by only 19.1%, there was a 5.5% improvement in load factor. Passenger, freight and mail traffic all showed a strong improvement.

TRAFFIC AND STAFF COMPARISON 1958/59

	Financial Year ended March 31 1959	Financial Year ended March 31 1958	Variation
Capacity ton-miles offered ..	181,056,000	160,282,000	+ 13.0%
Load ton-miles sold	109,364,000	102,062,000	+ 7.2%
Revenue load factor	60.4%	63.7%	− 5.2%
Passengers carried	2,828,715	2,765,591	+ 2.3%
Passenger miles flown ..	988,334,000	935,756,000	+ 5.6%
Passenger load factor	62.5%	68.5%	− 8.8%
Freight ton-miles	11,620,000	9,926,000	+ 17.1%
Mail ton-miles	4,058,000	3,600,000	+ 12.7%
Aircraft miles flown	35,899,000	33,205,000	+ 8.1%
Revenue hours flown	194,058	190,472	+ 1.9%
Average number of employees	11,606	11,011	+ 5.4%

Those Inclusive Tours

ALTHOUGH no statement—except a very brief one in the Chairman's Page of a recent *B.E.A. Magazine*—has been made by either side in the IATA inclusive-tour battle, it appears that British European Airways got most of what it wanted at the final traffic conferences in Paris. Exactly what the independent operators will get in recompense for their politeness at this meeting remains to be seen.

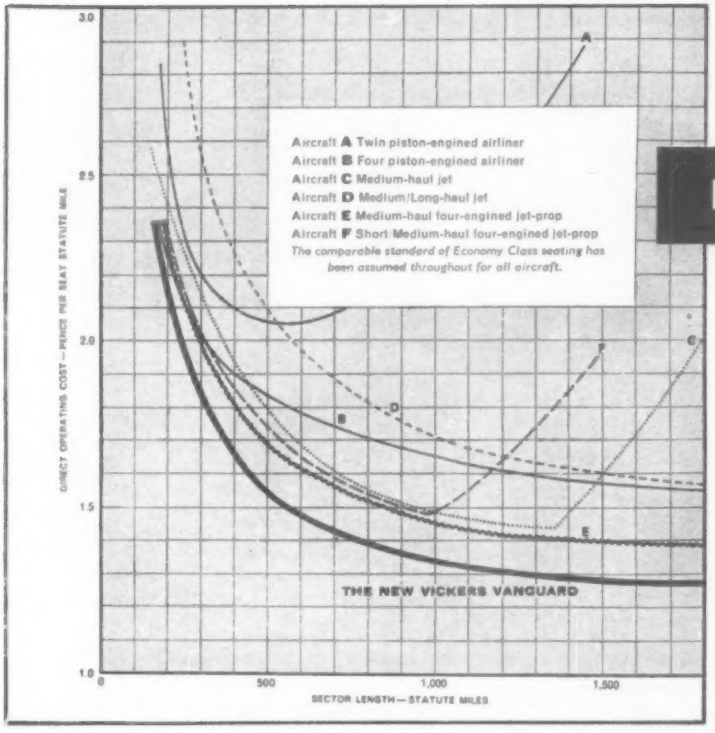
At the Cannes conferences the four British independent members of the Association stood out, from somewhat different standpoints and for different reasons, against B.E.A.'s proposals, running the risk of both Ministerial displeasure and of the accusation of being against the principle of the lowering of air fares. Their line was a very natural one and might be over-simplified as being that if B.E.A. was to be allowed to fly inclusive-tour passengers at a low rate on a fill-up basis, then the independents, who had made this business, should be given similar opportunities. So they resisted the B.E.A. plan at the Cannes meeting and this decision remained as open as that concerned with the proposed turbojet surcharge (or differential).

Between the Cannes and Paris meetings the British independent members of IATA were, presumably, told by the Minister of Transport that his Ministry must not be embarrassed in this way—that British domestic quarrels must not be carried on in public. The independents were taken by surprise at Cannes. Not only are they normally averse to fighting, publicly or otherwise, but there had been no previous consultations between the British carriers and, so far as can be gathered, the Ministry was rather disturbed by the lack of co-operation and co-ordination of policy before the IATA conferences.

(*Continued on page 517*)

DOLLAR PURCHASE.—The first Boeing 707-436 of the B.O.A.C. fleet of 15 is about to start its flight tests at Seattle, with a view to obtaining F.A.A. certification before the end of the year. The first delivery is expected to be made in December.

LOWER FARES



yet

MORE PROFIT

The attraction of cheap rate tickets has already been proved on long distance routes. On North Atlantic flights 60% of all passengers now travel at economy fares.

A similar cut in fares would be equally popular on short and medium-haul routes, and be the means of boosting traffic considerably. The only aircraft capable of bringing about these reductions, *and* making a profit, is the Vickers Vanguard.

In its economy class layout, the Vanguard has over 50% greater profit potential than any competitive air liner. By a substantial margin its seat-mile costs are the lowest on offer today.

Only the VANGUARD has all these features

425 m.p.h. cruising · Seat-mile cost as low as one cent per seat-mile · Freight capacity 10 tons at normal densities · Full routing and A.T.C. flexibility · Can use normal existing airfields · Quick turn-round · No airfield noise problems · Quiet, smooth flight · Ten years' unique Vickers Rolls-Royce jet-prop experience.

What fare cuts are possible?

At 65% passenger load factor the new Vanguard, in its 139-seater economy layout, can operate at 10% clear net profit with fares ranging from 29-50% below current tourist rates. In calculating these figures actual routes, current fares and current costs have been used.

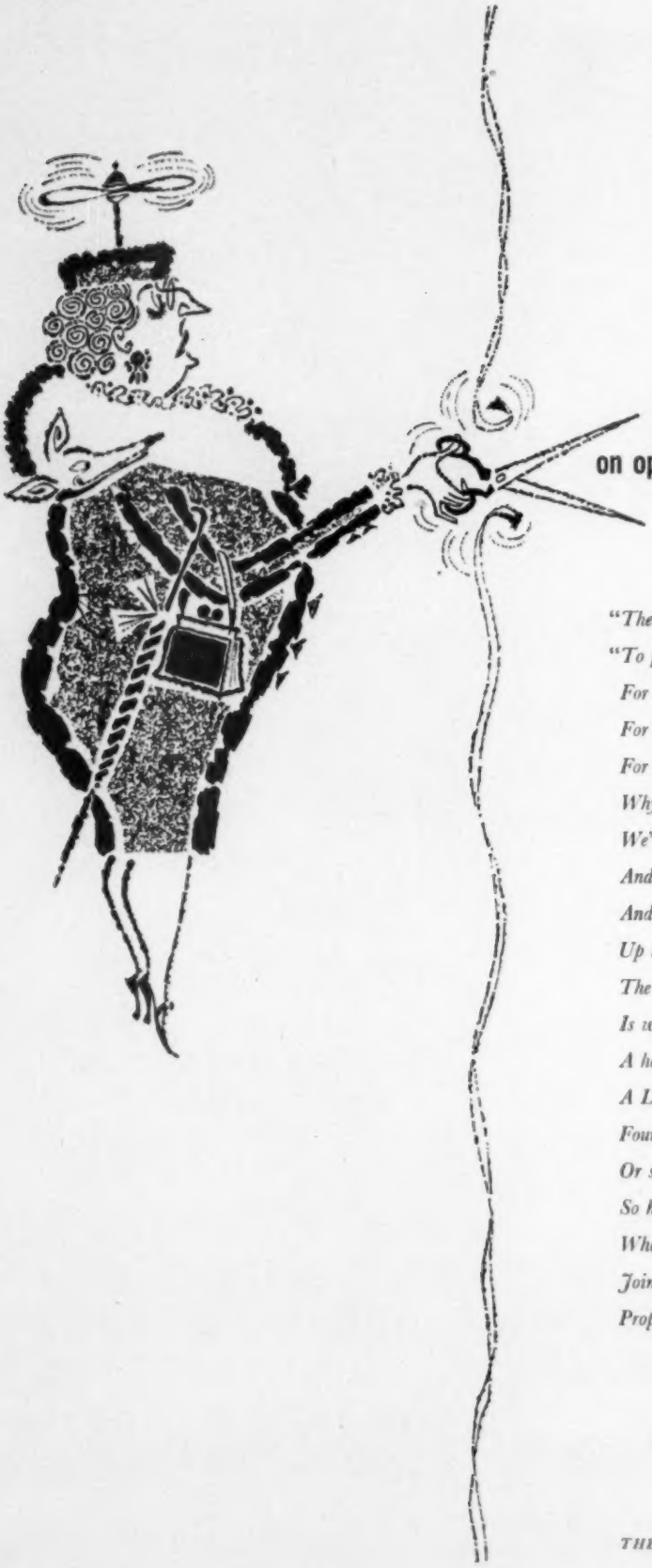
PROFIT with the NEW

VICKERS VANGUARD

FOUR ROLLS-ROYCE TYNE JET-PROP ENGINES

VICKERS-ARMSTRONGS (AIRCRAFT) LIMITED WEYBRIDGE SURREY

TGA AT599



Congratulations to **WESTLAND**

on opening the first

LONDON HELIPORT

"The Time Has Come!" brave WESTLAND said,
"To plan for many things.
For brand-new sorts of Heliports
For aircraft without wings.
For London needs a Heliport.
Why should she be left out?
We'll stand alone. We'll build our own,
And flatten every doubt".
And now, behold! They've proved their point
Up to, and past, the hilt.
The Heliport (Oh, splendid thought!)
Is well and truly built.
A helicopter's home from home.
A London Termi-nus!
Four miles by air from Grosvenor Square—
Or sixpence on the bus!
So helicopters, large and small,
Wherever you may be,
Join in the toast: "Our WESTLAND host!"
Proposed by

AIR BP

THE AVIATION SERVICE OF BRITISH PETROLEUM

(*Continued from page 516*)

In fact—and notwithstanding gloomy prophecies—it may well be that B.E.A.'s plan to increase inclusive-tour traffic will help, also, to increase the total interest in (and business for) these packaged tours by giving them added respectability. Coupled with the fact that the Corporation's planned I.T. fill-up services are nearly all at fairly inconvenient times, this effect may, at least on a short-term basis, be advantageous to all. The results may be rather like those after the introduction of the Colonial Coach services in 1952—but in reverse. Whereas those services introduced new traffic which had not previously travelled by air (or even travelled at all), B.E.A.'s inclusive-tour plan may give the business a further fillip without harming (and even possibly helping) the I.T. business of the independents.

But there are hidden bogymen behind the apparently simple battle between the British independents and the nationalized Corporation in this new inclusive-tour approval—and these are the European carriers. The inclusive-tour business has, so far, been very largely a monopoly for British carriers, but the agreement by which B.E.A. is now allowed to carry fill-up inclusive tourers on its scheduled services can be used to equal advantage by Continental carriers.

Since inclusive tour work has no international status, is done on a short-term, yearly basis and requires the active approval of foreign governments, the entry of overseas carriers into the business may well have a disastrous long-term effect. So far the business has been almost entirely British—and sponsored, therefore, by British carriers—but there may well be changes in the future.

But the plot has certainly paid off so far as B.E.A. is concerned. Regardless of the Cannes setbacks, the Corporation continued to go ahead and to sell allocations of seats to the agents for inclusive-tour passengers while reserving a percentage of capacity for the normal traffic on the selected services—which are mainly at night and on weekdays in the peak months. The forward bookings in March totalled 56,000 by comparison with 26,000 at the same time in 1958. But business already looks a good deal better for the European airlines in 1959 than it did at this time in 1958. In some weeks B.E.A. has been carrying 30% more traffic than in those of the previous year—H.A.T.

Essential Education

THE annual R.Ae.S. Air Transport Course—the fourth to be held and now well settled into a highly successful three-week pattern at Oriel College, Oxford—ended on April 20 with the informal and pertinently humorous oratory of the Bonally dinner.

This year, under the chairmanship of Dr. Ballantyne, secretary of the R.Ae.S. and director of the course, the more earnest speaker was Prof. J. C. Cooper, legal adviser to IATA and professor of air law at McGill University, Montreal; the lighter, but very pointful, contributions came officially from Mr. Peter G. Masefield, president-elect of the R.Ae.S., and, unofficially but fully planned, from Capt. D. F. O'Sullivan, a B.O.A.C. senior captain, speaking for the "pupils." The tenor of the lighter speeches, which were not designed to be reported solemnly in uninterestingly cold print, can be gauged by quoting one of Capt. O'Sullivan's many ingenious similes in which the airlines were likened to a housewife who asks whether she should save threepence by buying a great big economy packet or a smaller packet that she could afford. Copies of his simple exposition of the cloud-cuckoo-town equipment programmes of the operators should be made available to all the executives of the World's airlines.

The course this year was attended by some 40 students, many from abroad; and there were four resident lecturers—Mr. S. F. Wheatcroft, economics, Mr. K. G. Wilkinson and Mr. D. C. Tennant, operations, and Mr. A. R. Barrowclough, law—a dozen guest speakers and a score of guest lecturers from half a dozen countries. Mr. Tennant, incidentally, is director of operations planning for Trans-Canada Airlines and was a lecturer at last year's course.—H.A.T.

Sudan Airways Expansion

FROM June 8 Sudan Airways will start to operate services between Khartoum and London, via Cairo, Athens and Rome as traffic points, using a Viscount 831 (810 series), maintained and crewed by Airwork, which has been connected with the company since its formation in 1946.

This will be the first really long-haul operation by Sudan Airways, which has previously flown services domestically and to Aden, into Ethiopia and to Cairo and Beirut, using DC-3s and D.H. Doves. Initially the Blue Nile Viscount service, as it is to be called, will be operated at a once-weekly frequency to and from Gatwick Airport, making the flight in an elapsed time of a little less than 17 hours; and, between the return London flights, the Viscount will operate two services on the Khartoum-Cairo run. The Viscount, which is due to be delivered shortly, will be laid out with accommodation for 53 tourist and eight first-class passengers.

The general manager of Sudan Airways, Sayed Abdel Bagi Mohammed, who has been in London recently in connection with the new plans, served with Imperial Airways in pre-War years, and joined the newly formed Sudan Airways in 1947; he was appointed to his present post in 1955.

Approach Guidance Problems

RECENT snipings at the Ministry of Transport for its failure to warn pilots officially of prospective dangers may be expected to produce a spate of warnings about one thing and another. This will be all to the good if there are not so many of them that pilots suffer from eyestrain and ennui.

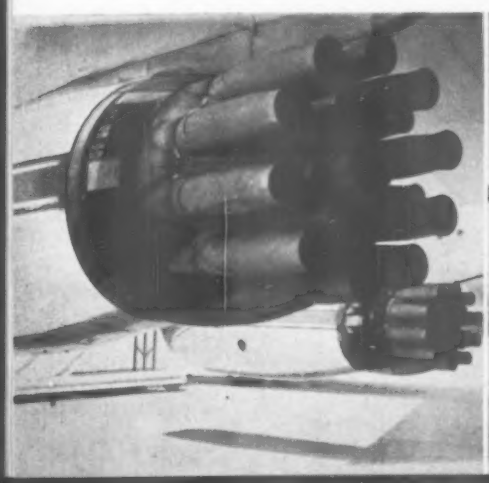
A good example of usefully educative material is that in the Ministry's Civil Aviation Information Circular No. 32 of 1959, which was issued a few weeks ago. This deals, in not too simple terms, with the possible errors during, and the prospective guidance methods for, an approach to land at night and/or in poor visibility.

The basis of the Circular can be summarized by saying that, with a crossbar or similar approach lighting system, it is comparatively easy to detect errors in lateral displacement and attitude, but that an error in height can only be detected if it is a large one and that an increase or decrease in height will not be appreciated for many seconds. Furthermore, while a lining-up correction is being made (which may take 12 seconds for a 100-ft. lateral error) visual judgment of height is liable to be upset by banking so that the descent is instinctively steepened. The Circular, which includes a bibliography and explanatory diagrams, warns pilots to be on their guard against steepening the descent and particularly in circumstances which make visual judgment of height more difficult than normal.

Correct approaches, whether made normally or with visual aids, are, after all, dependent largely on a continuous, instinctive comparison between the actual and in-trained ideal shapes of aerodromes, runways and approaches.

ODD PODS.—Methods of silencing and thrust-reversing employed on the three U.S. jet transports could be compared at Las Vegas when all three types of aircraft were on display. From left to right are the Boeing 707 (JT-3C); the Douglas DC-8 (JT-3C) with sliding rear nacelle fairing; and the Convair 880 (CJ-805-3).

Photographs copyright "The Aeroplane and Astronautics"



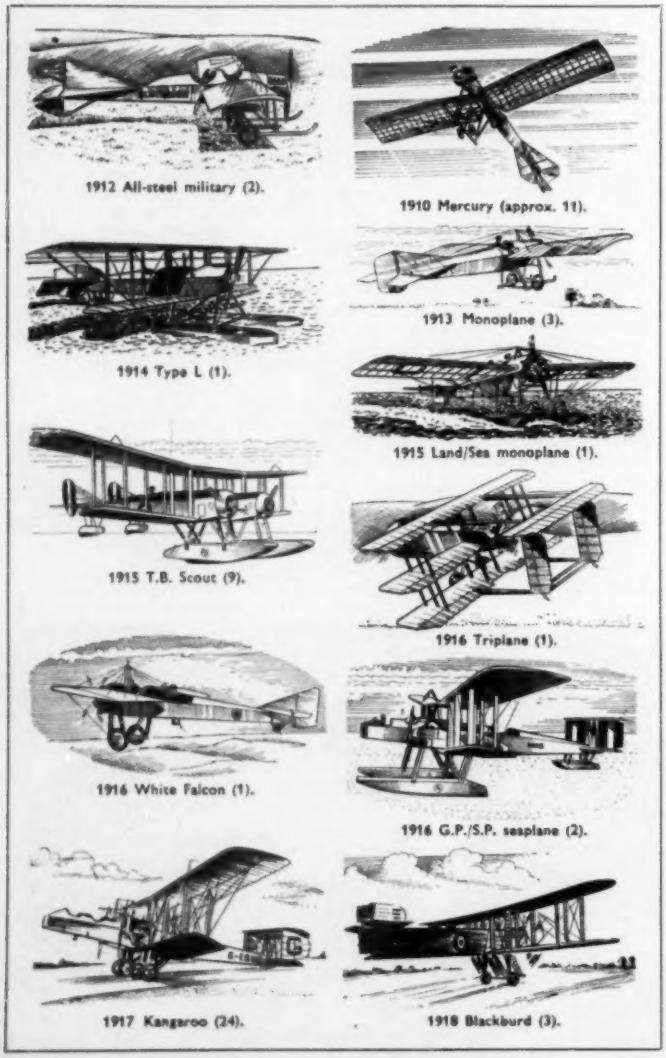
Fifty Years of Blackburn Aeroplanes

by F. G. Swanborough

ROBERT BLACKBURN'S first aeroplane was once described by C. G. Grey as "rather like a four-poster bed. The engine sat on the bed, so to speak, and drove the airscrew (which was on the level of the wing) with a long chain, and the pilot sat behind it. There were two wheels in front and one behind." The system of warping the wings by means of wires which also carried the load of the aft spars, C.G.G. continued, "was standard practice at the time, but looks suicidal today—as it often was then."

On this aeroplane, Robert Blackburn, at the age of 25, had a lot of fun taxi-ing up and down the fine stretch of sand between Marske and Saltburn, on Yorkshire's north-east coast. The extent to which this prototype ever really flew is not clear although it certainly got airborne; nor is the precise date of the trials on record. It is certain that Robert Blackburn was still testing this machine at Marske in May, 1910, and in that same year he listed it in a catalogue of types available—for £700. It may have been at Marske as early as April, 1909, a date which was first claimed in or about 1917.

Robert Blackburn came of an engineering family; after taking an honours degree at Leeds University and qualifying as an A.M.I.C.E., he went to France and in 1908 was working in a civil engineering consultants' company in Rouen when he was fortunate enough to see Wilbur Wright flying. His imagination was fired and he returned forthwith to Paris, where he set about designing his first aeroplane.



1912 All-steel military (2).

1910 Mercury (approx. 11).

1913 Monoplane (3).

1914 Type L (1).

1915 Land/Sea monoplane (1).

1915 T.B. Scout (9).

1916 Triplane (1).

1916 White Falcon (1).

1916 G.P./S.P. seaplane (2).

1917 Kangaroo (24).

1918 Blackburd (3).

The first monoplane was built in a small workshop in Benson Street, off North Street, in Leeds. Among the unusual features of this aircraft, with its 35-h.p. Green engine, were the track-mounted seat to allow for C.G. control, and the unified flight control system "or triple steering column," as "R.B." called it, in which "elevators" and "rudder" functions of the all-moving tail unit, and wing warping, were all controlled from the single wheel. This system later had to be abandoned in favour of the more conventional separate rudder bar and stick, but it was retained in several of the early Blackburn monoplanes.

Following a crash with No. 1 in the spring of 1910, a second monoplane was designed and built. This time, French influence was very evident, the general appearance closely resembling that of Levavasseur's Antoinette. In detail, however, Blackburn incorporated many refinements, and he again chose to use a comparatively untried engine. This was the 40-h.p. seven-cylinder air-cooled radial developed by R. J. Isaacson, a brilliant engineer then working for the Hunslet Engine Co. in Leeds. Advanced features included overhead valves worked by push-rods, and a reduction gear for the propeller.

Like most clever ideas, this engine took a long time to develop, and plans to fly the second monoplane at the Blackpool Flying Carnival in August, 1910, had to be abandoned, although it was actually taken to Blackpool. It later flew well and provided the basis on which "R.B." built his reputation in the next few years. At Filey, he rented a shed from J. W. F. Tranmer and built himself a bungalow on top of the cliffs, joining the small band of aviators then using Filey sands for their early attempts to fly.

There, his efforts attracted the attention of B. C. Hucks, a young enthusiast who had been "chief of staff" to Grahame-White at his school at Pau but who had yet to learn to fly. This he did on the Blackburn Monoplane at Filey, taking his R.Ae.C. Aviator's Certificate on it in May, 1911, and becoming one of Britain's outstanding pilots of the pre-War era.

By July, 1910, "R. Blackburn, A.M.I.C.E.," was advertising his business from 18 Spencer Place, Leeds, offering to build aeroplanes to customer's designs and specializing in propellers. The 1910 catalogue, already mentioned, offered the No. 2 monoplane at £550. The triple steering column could be bought for £10 and an "automatic control for stability" for £6. The latter was a compressed-air cylinder controlled by a pendulum—and therefore sensitive to acceleration and not wholly effective. Propellers were charged at the rate of £1 15s. per foot of diameter.

Variants of the second monoplane, called the Mercury, and powered variously by Isaacson, Gnôme, Green or Renault engines and with one or two seats, appeared at intervals through 1911 and 1912. All retained the basic triangular fuselage section, rectangular wing plan and characteristic divided rudder of the original Antoinette. They were built at new premises in Balm Road, Leeds, by the Blackburn Aeroplane Co., in which venture "R.B." was now helped by Mark Swann and George Watson, as well as his original helper, Harry Goodyear.

At Filey in 1911 Hucks established a Flying School, where he was succeeded in due course by Charles Brereton and then Hubert Oxley as chief instructor. The school moved down to Hendon in mid-1912, and there, Harold Blackburn (no relation) became chief instructor and continued the work of popularizing the Blackburn monoplane begun by Hucks with his three-month tour of the West Country at the end of 1911.

During 1912 Blackburn produced two all-steel monoplanes with military purposes in mind, although they were not in fact entered for the British Military Trials in August of that year. Their claim to fame lies in the fact that they were the first all-metal structure aeroplanes of original British design.

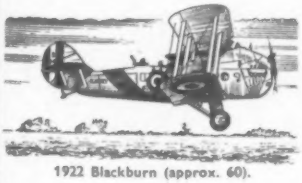
During 1913 and the early part of 1914 Robert Blackburn began to diversify his design activities. The single and two-seat monoplanes of 1913 bore little resemblance to the original Mercury and in the same year work started on the first Blackburn biplane—a floatplane for the 1914 Circuit of Britain. In May, 1914, the company was invited to participate in production of the B.E.2c—the Farnborough biplane adopted as standard for use by the R.F.C. and the R.N.A.S.

The War Years

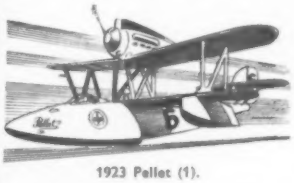
The first official order placed with the Blackburn company was for 12 B.E.2c biplanes for use by the Admiralty. The total effort required to produce these aeroplanes was a mere fraction of that required for a single NA.39 today, but for

1919 Sidecar (1).

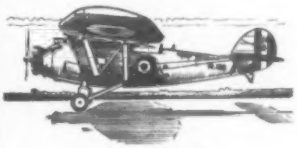
1920 Swift/Dart/Velos (over 100).

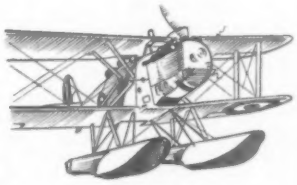

1922 Blackburn (approx. 60).

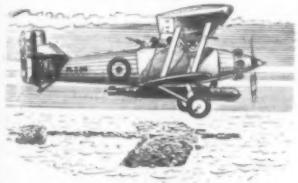
1923 Cubaroo (2).


1923 Pellet (1).

1926 Ripon (105).


1926 Airedale (2).


1926 Sprat (1).


1928 Beagle (1).

1928 Nautilus (1).

1928 Lincock (approx. 8).

Robert Blackburn it meant the beginning of series production and a search for new premises. These were found at Olympia, a disused skating rink in Roundhay Road, Leeds, and in June, 1914, a limited company was formed as The Blackburn Aeroplane and Motor Co., Ltd., at this address. Capital was £20,000 in £1 shares and the first directors were R. Blackburn and J. E. Jackson. Mr. Stuart Hirst (who died last January), was appointed the first chairman.

Further orders for the B.E.2c, all for the Admiralty, brought Blackburn closely into contact with Naval aviation for the first time and laid the foundations of a specialization which has continued without interruption to the present day. Other contracts from the Admiralty followed—for a total of 176 Sopwith Baby single-seat floatplanes, and for more than 100 Sopwith Cuckoo torpedo bombers.

In addition to its own production activities at Olympia, the Blackburn company and Robert Blackburn in particular also became concerned, during the First World War, with a whole group of sub-contract manufacturers in the Leeds area, who had no previous aircraft experience.

While series production at Olympia was mostly concerned with outside designs, the Blackburn company also built a variety of aircraft to its own designs. These included a triplane designed by Harris Booth after he had joined the company from the Admiralty Air Department; a small production batch of twin-fuselage seaplanes; the S.P. and G.P. twin-engined seaplanes which formed the basis of the Kangaroo; and in 1918, the Blackburd. The latter was significant as it was the first Blackburn aeroplane designed as a torpedo-carrier and therefore was the true ancestor of the NA.39 to-day.

Blackburn had already been entrusted with development of the original Sopwith Cuckoo bomber into the Navy's first torpedo-carrier. When, early in 1918, the Air Board urgently required a new specialized torpedo aeroplane capable of carrying the weighty Mk. VIII Naval torpedo, the company was so determined to persevere in this line that it offered to build three prototypes for £2,200 each, or almost exactly two-thirds of the actual cost. As it happened, the end of the War brought to an end development of the Blackburd; but the company had staked its claim in the torpedo-carrying field—and of 34 different basic types flown since the Blackburd, 13 have been designed primarily as torpedo carriers.

Another consequence of the mounting specialization in naval craft was the establishment of a unit of the company at Brough, on the edge of the Humber estuary near Hull. An airfield had been established at Brough in 1914 and Blackburn first tested an aeroplane there (the G.P. seaplane) in 1916.

Peacetime Problems

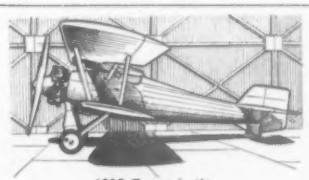
Inevitably the end of the War in November, 1918, brought about a sudden and almost total curtailment of military orders for aircraft. While those sub-contractors whose primary business was outside aviation could absorb the shock of this termination without too much difficulty, manufacturers who, like Blackburn, were wholly devoted to the manufacture of aircraft faced disaster.

For a month or two this seems not to have been realized; there was a first flush of enthusiasm over the prospects of a popular demand for aerial transportation which was shown, in Blackburn's case, by the construction of a light two-seat tourer and the formation of the North Sea Aerial Navigation Co., Ltd., in April, 1919, to run a regular passenger and freight service with Kangaroos across the North Sea to Holland, Denmark and Norway. This mood quickly passed, to be followed by a more sober assessment of the future prospects. It became clear that there were tough times ahead.

The Blackburn company entered the difficult peacetime years with a large and well-equipped factory at Olympia, in Leeds, an airfield at Brough, an airline—and no work. Robert Blackburn retained direct control of the day-to-day affairs, and obtained the services, as director and chief designer, of Major F. A. Bumpus, who had been the Air Board's resident representative at Leeds during the construction of the G.P. seaplane. At Brough, in 1919, a new Lion-engined single-seat torpedo-dropper was designed and a prototype was exhibited at the first British post-War Aero Show at Olympia (London) in July, 1920.

The Swift, as this prototype was known, was purchased by the Air Ministry and tested at Martlesham, and was the progenitor of a whole series of Naval aeroplanes which enabled the company to survive the lean years of the twenties and early thirties. Directly descended from it were the Dart, Blackburn, Ripon, Baffin and Shark, all of which served with the Fleet Air Arm in succession; and the Velos and Ripon 3MR4 for export. Less directly related, but also developed to official requirements, were aeroplanes like the Cubaroo, Sprat, Nautilus, Beagle, Airedale and M.1/30.

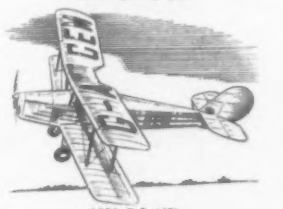
Olympia was retained until 1925, with a pay-roll of about

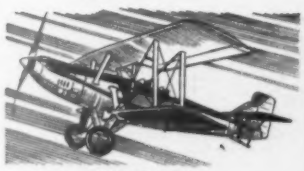

1928 Turcock (1).

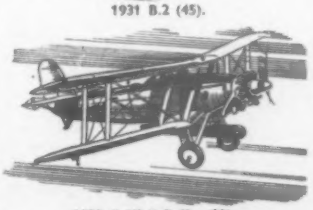
1929 3MR4 (1).

1930 Sydney (1).

1926/1929 Bluebird (69).


1931 B.2 (45).


1932 M.1/30 (2).


1933 B.4/B.5 Baffin (29).

1926/1933 Iris/Perth (10).

1,000, and during this period the company produced, amongst other things, a motorcar with a boat-built body. The final and complete move to Brough was, however, inevitable, as there was no aerodrome in Leeds.

By this time a flying school was getting established at Brough, after a slow beginning. It had been formed in 1924, when it had become clear that the demand for an air service across the North Sea did not exist. Captain Norman Blackburn (Robert's brother) was appointed manager and Sqn. Ldr. A. H. Loton became chief instructor. The school was equipped with Kangaroos (which were going strong until 1929) and, later, Darts, Bluebirds and B.2s, and became one of the established R.A.F. Reserve schools where pilots received their annual refresher courses.

The North Sea Aerial Navigation Company, meanwhile, had turned to joy-riding and exhibition flying, under the management of Major R. M. S. Veale. Eventually the name was changed to North Sea Aerial and General Transport, Ltd., and the company added to its tasks the organization of road and air transportation for the Blackburn company.

In 1924 Robert Blackburn turned his attention to another airline operation—the establishment of an air route from England to the Cape. On behalf of the North Sea company, Capt. Tony Gladstone, a Blackburn director, set off in a Jaguar-engined D.H.50J floatplane, to survey the route and to discuss formation of an airline with the Governors of the African colonies along the route. His efforts resulted in many promises of support and financial aid for the venture.

After Alan (now Sir Alan) Cobham's survey flight to and round the Cape in a Singapore in 1927, the two pioneers merged their interests in Cobham-Blackburn Air Lines and work began at Brough on a flying-boat suitable for the service, via the Nile and the African lakes. In 1930, however, Imperial Airways inaugurated a landplane service on this route and the Cobham-Blackburn combine was disbanded.

Exports

Between 1919 and 1939 the Blackburn company derived a fair proportion of its income from the export of various of its products and, more especially, from the production of Blackburn aircraft abroad. Export success came as early as 1920 with the Swift, which was ordered in small quantities by Spain and for evaluation by the U.S. Navy: and two were taken to Japan in 1921 by the British Air Mission to the Japanese Navy. Much the most important of Blackburn's foreign contacts, however, was with Greece. When the Greek Navy decided to establish a Naval Air Service and a factory for the production, overhaul and maintenance of its aircraft, the Blackburn company was not unnaturally consulted. As a result, Robert Blackburn visited Athens in December, 1924, and concluded a contract to organize and administer the factory for five years from July 1, 1925.

A number of technical staff was provided from England, and the first product of this Greek factory (at Old Phaleron, just outside Athens) was the Blackburn Velos torpedo-bomber. In later years, many other types of aircraft were built there; the Blackburn contract was renewed for seven years in 1930 and the last of the Blackburn staff did not leave until 1938.

Other Blackburn types built under licence included the Ripon in Finland; the Lincock and Segrave in Italy; the Lincock in China; the Ripon 3MR4 in Japan and the Shark in Canada. These types, and others, were also exported in fair numbers.

Blackburn's interest in the light aircraft market had been evident as early as 1919, as already noted. The Light Aeroplane Competition at Lympne in 1924 revived this interest in the company and resulted in production of the Bluebird. This was an attractive little biplane with side-by-side seating, which was at first underpowered with a Blackburn Thrush engine, but later flew successfully with the 65-h.p. Armstrong Siddeley Genet engine.

The prototype, and the production Mks. II and III which followed were of wooden construction, while the Bluebird IV was all-metal. Several outstanding flights were made by Bluebirds, including one in 1929 by Sqn. Ldr. L. H. Slater from Brough to Durban, Natal, and another by the Hon. Mrs. Victor Bruce, in 1930, who took a Bluebird through Arabia, India, China, Burma, Siam, Japan and America, covering about 19,000 miles. Bluebirds won the Grosvenor Cup in 1926 (Sqn. Ldr. Walter Longton) and in 1931 (Sqn. Ldr. J. W. Woodhouse); and the King's Cup in 1931 (Flg. Off. E. C. T. Edwards). They also became standard *ab initio* equipment at the Flying School at Brough.

From the Bluebird came the Blackburn B-2, which also was widely used at Blackburn's own schools at Brough and at Hanworth, and participated in many pre-war sporting events.

Co-operation between Blackburn and Saro in the production of the Bluebird led, in 1930, to the construction at Brough of the twin-engined Segrave, after Saro had built a prototype, known as the Meteor, to the designs of Sir Henry Segrave, technical director of the Aircraft Investment Corporation. The Blackburn Segraves differed from the prototype in being of metal construction, and the last of three built was of special interest as it had a Duncanson single-spar wing—with a tubular spar which formed the fuel tank.

In 1929 the company obtained Air Ministry backing for the construction of directly comparable twin-engined monoplane and biplane 10-passenger civil transports, which appeared in 1932. Both prototypes were powered by Jaguar engines and were tested at the A. and A.E.E., Martlesham, in 1933, when it was found that the monoplane, nearly 1,000 lb. heavier, was some 10 m.p.h. faster at all altitudes.

One of the aircraft for which Blackburn became famous in the years between the Wars was the Lincock, a private-venture light fighter designed around the supercharged Lynx engine. The first Lincock flew in 1928 and was of wooden construction; later examples were of metal (and, naturally, known as "Tincocks"—while those exported to China became "Chincocks"). This theme was continued with the Blackcock fighter project to Spec. F.20/27, and the similar Turcock for Turkey.

Flying-boats

Blackburn's first flying-boat, the N.1B, had been designed to an Admiralty specification in 1917, but construction of the three prototypes which had been ordered was later cancelled. For the 1923 Schneider Trophy contest, held at Cowes, Blackburn completed construction of one of these boats, with modifications, and christened it the Pellet. An attractive little biplane with the propeller of the Napier Lion engine revolving perilously close behind the pilot's head, the Pellet was dogged by misfortune.

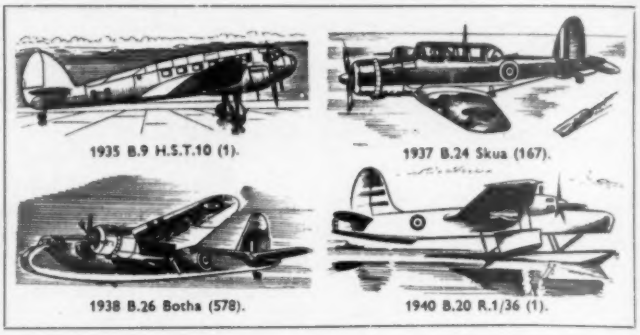
At the first launch, at Brough, the wing-tip floats were found to lack sufficient buoyancy and, caught by the tide, the Pellet dipped a wing and turned turtle. Reggie Kenworthy, who had succeeded Roland Ding as test pilot, was fortunate to escape with a ducking; he was even luckier to escape unhurt three weeks later, when, on September 27, the hastily repaired Pellet porpoised and sank while taking-off for the navigability test in the Contest itself, having made the briefest of test flights the day before.

In 1923 also, the company decided to extend its maritime aircraft specialization by employing Major J. D. Rennie as flying-boat designer. The first big Blackburn flying-boat was the Iris, which was designed to an official specification and appeared in September, 1926. Production orders were counted in ones and twos in those days, and only 10 of those stately boats were constructed (including four of the developed version called the Perth). Nevertheless, the Iris and the Perth were a feature of Blackburn's production and development activities until 1935, and were in service with the R.A.F. for five years.

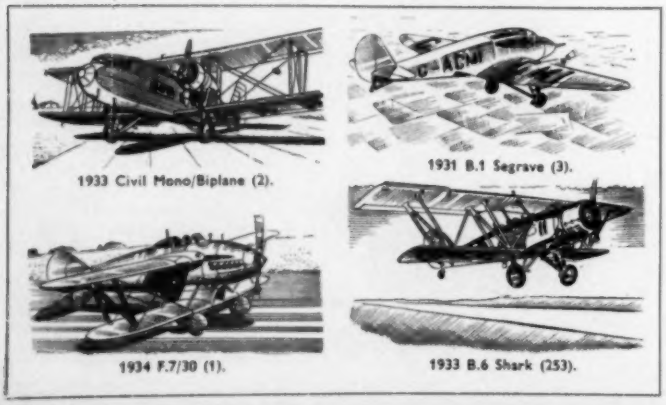
While work with the Iris, which existed in both wooden and metal versions, continued, Blackburn produced, in 1929, the Sydney—a monoplane boat based on the Iris hull but with much improved crew accommodation in the superstructure.

By far the most interesting of all the Blackburn boats was also the last—although further project designs were studied until a few years ago. In 1935, Maj. Rennie conceived the idea that some form of retractable hull would make possible the design of more efficient flying-boats on two counts—by

(*Continued on page 521*)



1935 B.9 H.S.T.10 (1). 1937 B.24 Skua (167). 1938 B.26 Botha (578). 1940 B.20 R.1/36 (1).



1933 Civil Mono/Biplane (2). 1931 B.1 Segrave (3). 1934 F.7/30 (1). 1933 B.6 Shark (253).

Airlines that are early with the COMET *establish an enduring traffic lead*

Early operator gains traffic immediately, and retains the lead
Later jet operator, having lost traffic, always lags behind

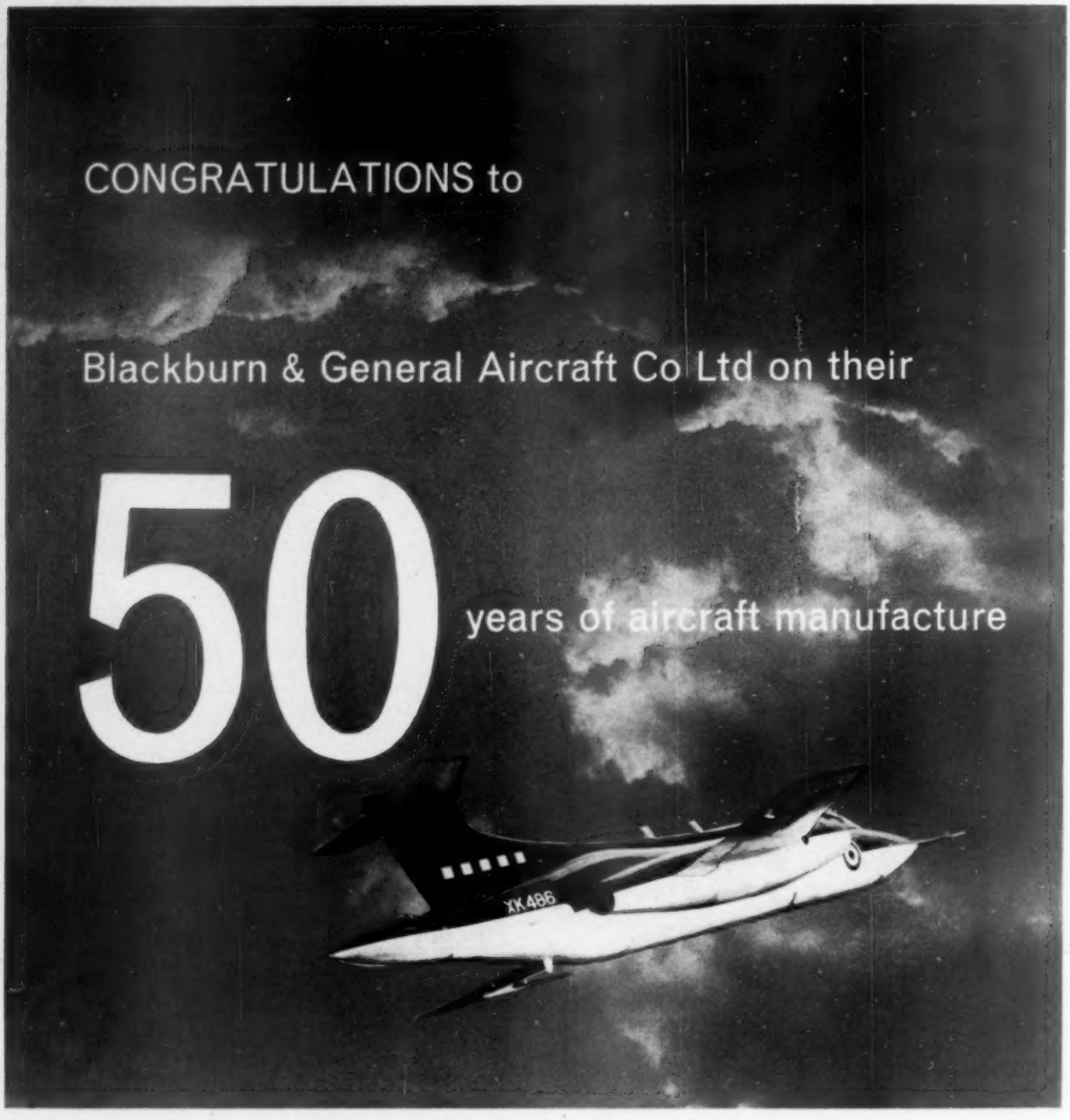
The COMET jet airliner

(Rolls-Royce Avon engines)

Earliest delivery—the right-sized jet at the right time
Can go everywhere—easily uses existing airports
Pays its way on moderate traffic—and with high frequency
Superlative jet comfort and jet speed
A known quantity—proven aircraft, proven engine

D E H A V I L L A N D

FIRST JET SERVICE LONDON—TOKYO. FIRST JET SERVICE ACROSS THE NORTH ATLANTIC. FIRST JET AIRLINER ACROSS THE SOUTH ATLANTIC. FIRST JET AIRLINER ACROSS THE PACIFIC. FIRST JET AIRLINER AROUND THE WORLD. FIRST JET SERVICE IN LATIN AMERICA. FIRST JET AIRLINER



Flight Refuelling Ltd. are proud of their long and cordial association with this Company in the supply of FR Fuel System Equipment, which is currently fitted to the N.A.39.

FR

Flight Refuelling Ltd

Tarrant Rushton Airfield, Blandford, Dorset. Telephone: Blandford 501

(*Continued from page 520*)

reducing the depth of the hull dictated by propeller clearance problems, and by reducing the amount of incidence on the wing, with a consequent reduction of drag in cruising flight.

A patent drawing published in THE AEROPLANE for June 10, 1936, showed how this might be applied to a twin-engined flying-boat, although it was not then revealed that Blackburn already had a contract from the Air Ministry for the construction of a prototype. This was the B.20, which was built at Dumbarton and eventually appeared early in 1940. Designed primarily to explore the retractable-hull layout, it was envisaged as a general-purpose and patrol boat, of 35,000-lb. gross weight, operated by a crew of 6-7 including gunners. With pontoon retracted, the hull depth was 11 ft. 8 in., increasing to 16 ft. 4 in. with the pontoon down; wing floats retracted also, to form the wing tips.

For its time the B.20 was certainly the cleanest flying-boat in the World, and the estimated top speed of 322 m.p.h. at 15,000 ft. has probably never been surpassed by a piston-engined boat. Preliminary trials showed that the retractable pontoon worked as planned, but the B.20 was lost on an early test flight when aileron flutter developed; all on board except the pilot, D. L. Bailey, baled out successfully. The pressure of War-time activities precluded further development although other retractable-hull boats had already been designed.

Cirrus Engines

Although the name of the company had been the Blackburn Aeroplane and Motor Co., Ltd., since 1914, aero-engines did not figure among the products until 1934, when the Cirrus-Hermes Engineering Co., Ltd., became part of the Blackburn group and moved into new premises at Brough. Cirrus-Hermes had, in 1931, taken over Cirrus Aero-Engines, Ltd., which in turn had been formed in 1927 by the Aircraft Disposal Co., Ltd., to make the Cirrus engine which the late Frank Halford had designed.

Soon after the acquisition of Cirrus-Hermes, all the Blackburn interests were consolidated into the Blackburn Aircraft Co., a public company of which Robert Blackburn remained chairman and managing director, with Maj. F. A. Bumpus as deputy managing director. Maj. Rennie and George Petty were chief designers, respectively, of seaplanes and landplanes.

As the re-armament programme got into stride in 1936-37, the Blackburn company found it necessary to devote all its resources to meeting the Navy's requirements. Plans to produce a small transport and feeder-liner based on the Duncanson wing had to be abandoned after a whole series of twin and four-engined designs, and one prototype, had been made.

The line of torpedo biplanes for the F.A.A. had by this time progressed through the Ripon and Baffin to the Shark, which was to be the last of the biplanes although it remained in service for much of the War. In addition to being built at Brough for the Royal Navy, Portuguese Navy and Royal Canadian Air Force, the Shark was put into production in Canada at the Boeing Aircraft factory at Vancouver.

After the Shark came the Skua, the first Blackburn monoplane to go into production, and the first monoplane to become standard Naval equipment. This was a fighter dive-bomber, carrying its bomb-load externally under the fuselage, and was to claim the distinction, on September 26, 1939, of being the first British aeroplane to destroy an enemy aircraft during the Second World War.

The line of torpedo bombers was continued with the Botha, for which substantial contracts were placed shortly before the outbreak of War—contracts which required the company to resort to sub-contracting on quite an extensive scale. Changing requirements and some persistent control problems kept the Botha out of front-line service but several hundred were built at Brough and at another Blackburn factory at Dumbarton.

This Dumbarton factory was the outcome of an agreement between Blackburn and William Denny and Brothers, famous shipbuilders on the Clyde, at a time when the pre-War expansion was at its peak and large orders were expected. Sir Maurice Denny joined the Blackburn board, and Maj. Bumpus was detailed to organize the new factory—where he remained in charge until the end of the War. In the event, the Botha and the single B-20 were the only Blackburn types produced at Dumbarton, which built 250 Sunderlands as its principal contribution to the War effort.

Production of outside designs, under direct contract to the M.A.P., was to become a major Blackburn activity, and called for the construction of a complete new assembly factory to be supplied by a group of "daughter" firms—an activity in the organization of which, as already related, Robert Blackburn himself was already experienced. In 1939 the company was asked to become the primary source of Fairey Swordfish biplanes for the Navy, and it was decided to build a new assembly plant at Sherburn-in-Elmet, where an airfield was already available.

1942 B.37/B.46 Firebrand (223).

1947 B.48 YA.1 (2).

1953 B.101 Beverley (46).

1949 B.54 YA.5/YB.1 (3).

Construction of the new sheds began at Sherburn in January, 1940, and the first Swordfish (or "Blackfish," as the Blackburn-built ones were usually known) was delivered on December 29, 1940. By the end of the War, Sherburn had built 1,699 Swordfish out of the grand total of 2,393.

Meanwhile, the Botha was followed in the Brough shops by another Fairey type, the Barracuda, thus continuing, even with the types of outside design, the specialization in torpedo-carriers and Naval craft. The company built 695 Barracudas.

In 1940 Blackburns successfully tendered to a specification for a new Naval fighter designed around the Napier Sabre engine. Three prototypes were ordered, and by the time the first of these flew in February, 1942, the type had been named the Firebrand and ordered into production. Troubles with the Sabre, and a change of requirements following the introduction of the Seafire and Sea Hurricane, led to a re-assessment of the Firebrand in 1943, and its subsequent development, with a Bristol Centaurus engine, as a torpedo-fighter.

Peace Again

The end of the War brought, for the second time in 30 years, a sudden and near-disastrous decline in work. For a year or two, the company survived on Firebrand production, modification and overhaul; on development contracts concerned with strike aircraft to succeed the Firebrand; and on production contracts placed by the M.o.S. for trainers—the Prentice and the Balliol—for the R.A.F. Then in 1948 came news of a significant development—the merger of Blackburn's interests with those of General Aircraft, Ltd. This agreement amounted in effect to a sell-out by General Aircraft of all its undertakings, including work in hand, stock, contracts, designs and patents.

With effect from January 1, 1949, the name of the company was changed to Blackburn and General Aircraft, Ltd., while General Aircraft changed its name to Hanworth Securities, and on this date, Robert Blackburn relinquished his appointment as joint managing director but remained chairman of the new company.

At the time of this merger, General Aircraft, Ltd., were building a large freighter against an Air Ministry contract, and henceforth this Universal Freighter became a Blackburn project. Developed into the Beverley, it went into production in 1953 and kept the Brough works occupied for five years.

While the Cirrus Minor and Major and the larger Bombardier piston engines continued in production for civil and military users throughout the world, the company negotiated, in 1952, an agreement with the French Turboméca concern, as a result of which gas turbines were added to the range of products.

Work on the latest Blackburn aeroplane, the NA.39, began in 1955 under the direction of Barry Laight, who had succeeded George Petty as chief designer in 1952. Overall control of the project was assumed by N. E. Rowe, who joined the company as technical director in 1951.

In the NA.39 the wheel has come full circle, for this is the Navy's latest and best strike aircraft, designed to carry homing torpedoes or tactical nuclear bombs at transonic speed at low level. It is a salutary thought that the development contract calling for the production of 20 of these two-seat twin-jet aeroplanes, and the production contract for a greater number, almost certainly represent in value, in man-hours on the floor and in gross weight as much as the whole of Blackburn's efforts in the two decades between the Wars.

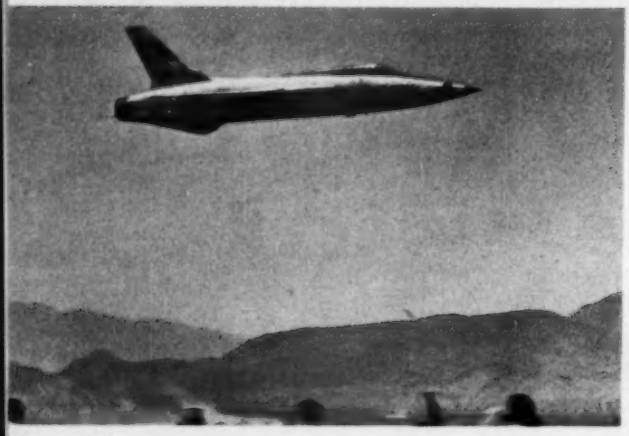
Robert Blackburn died on September 10, 1955, having remained at the helm of his own company for 45 years including the difficult periods of two major wars and their aftermath. The NA.39 made its first flight 2¼ years later, on April 30, 1958, and there is some reason to believe that it was on the last day of April, too, nearly half-a-century earlier, that Robert Blackburn himself first flew with his "sand-hopper." On April 1, 1959, a further re-organization of the company took place, to form three subsidiaries concerned with aircraft, engines and electronics respectively, and this change is expected to be followed in due course by a change in name of the parent company, probably to the Blackburn Group, Ltd.

MAY 1, 1959

Air Power

Photographs of the two displays taken by Cha

Above, a Boeing KB-50J tanker of Tactical Air Command refuels a flight of F-100s.



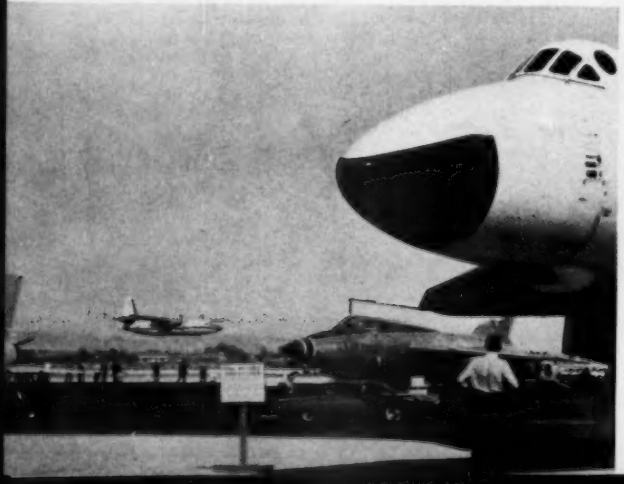
Left, the Republic F-105 Thunderchief at sonic speed passes the spectators at Indian Springs.

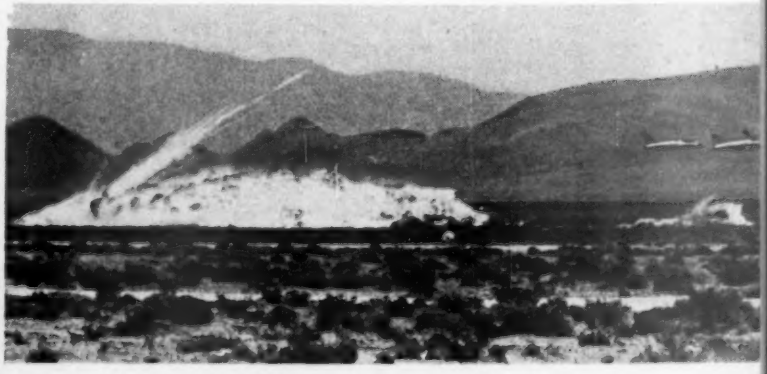
Above, Brig.-Gen. J. C. McGehee, U.S.A.F., H.R.H. Prince Bernhard of the Netherlands a Secretary of the Air Force, at the start o

Below, the Convair 880 shows its climb rate out of McCarran airfield.

Above, Boeing B-47s fly under an artificial cloud made by photo flashes from an RB-66 aircraft.

Below, on show at the McCarran airfield the Fairchild F-27 in flight and the F-105 and Vulcan static.





Above, low-level Napalm attack by F-100s.

Right, the Navy's here! C Tigers of the "Blue Ange

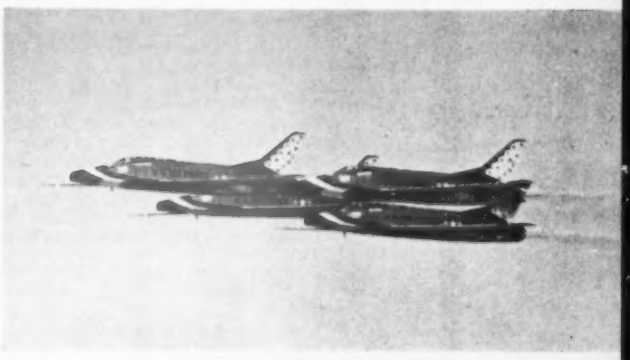
t Las Vegas Congress

ain flying
s Sims

ommander of Nellis A.F.B.,
(behind) James H. Douglas,
he Indian Springs display.

Above, R.A.F.'s Transport Command Comet 2 shows how to climb out of Nellis A.F.B.

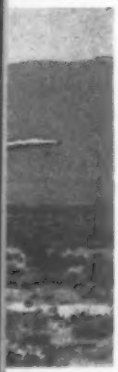
Left, Vulcans of No. 617 Squadron, R.A.F., coming in for their climb demonstration.



Above, U.S.A.F. aerobats : the "Thunderbirds" with their F-100s.

Below, the initial fly-past of the Netherlands aerobatic team on F-84Fs.

Above, a Vulcan waits its turn to go whilst two F-102s depart for Indian Springs.



mman
team.

Report from Las Vegas Air Show

THE first World Congress of Flight held at Las Vegas in the United States from April 12-19 must be regarded as one of the major aviation events of 1959. It was, however, not the international affair that its title implies. Of the 77 nations invited only 40 or so accepted and their participation was meagre to say the least.

The net result of this timidity left the U.S.A., the sponsor nation, with the responsibility for supplying not only the organization but the main exhibits and items of display. However, it was in the field of discussion—addresses and symposia were held every day throughout the week—the true international atmosphere of the event developed. Here many of the famous names in aviation and its associated technologies discussed their work, problems and findings for the benefit of all who cared to attend.

The centre of the Congress was a vast circular building covered by a dome of shining aluminium visible for miles around and which was only quite recently constructed as a permanent convention home for the fabulous holiday town of Las Vegas. The building consists of a central, vast auditorium with smaller halls, conference rooms, restaurants, a massive news room, private suites and an exhibition hall built around it. It is air-conditioned, beautifully carpeted and decorated and has car parks, a helicopter site, and a display ground, all in the adjacent spaces.

In addition to the goings-on in this centre, three air displays were held during the week at nearby airfields and a continuous demonstration of light aeroplanes and helicopters was kept up on the grounds of an adjoining race-course.

Indoors, the Congress was opened by a reception to all the delegates and an address by the general chairman of the Congress, Mr. Edward P. Curtis. On Wednesday a great banquet was organized to celebrate the anniversary of NATO, on April 15, with H.R.H. Prince Bernhard of the Netherlands as the principal guest and speaker.

The Static Show and Civil Flying

The static exhibits were divided into two categories—those that were shown off in booths such as we know in the "big tent" at Farnborough—electronics, engines, instruments, model aircraft and so on—and the bigger stuff—missiles, vehicles and equipment—accommodated on the outside showground.

The interior hall occupied about half the area of our own S.B.A.C. static exhibition and its occupants were pretty nearly 90% American. It seemed a great pity that British exhibits were so few, for only the products of Rolls-Royce, Napier and Lucas were there to represent our industry.

On Monday afternoon (April 13) a short display of flying by civil aircraft was held at the McCarran airfield, the airport of Las Vegas, and the feature of this was the presence of many of the U.S.A.'s latest jet transports. Probably, for the first time ever, the Boeing 707, Douglas DC-8, Convair 880 and the Lockheed Electra all stood together on the apron. In addition there was the Fairchild F.27, or as we know it the Fokker Friendship, a specimen of the Convair 540, which we suspect was one of the original Napier conversions rather than a Canadair product, and a round dozen or so military types which, of course, did not fly but were there purely for show.

The Boeing disappointed by not only taking-off 20 minutes before the show started but in not returning to it. The DC-8, which was fully seat-furnished, made a spectacular take-off on the longest runway and one pass over the field, but it also did not land back at McCarran. The Convair 880, the second prototype, I believe, and not furnished at all, did a short run take-off on the lesser runway—a feat quickly brought to our notice by the General Dynamic's commentator—and then proceeded to do a series of low-level fly-pasts with, on some runs, a percentage only of its engine power.

The Electra performed like an accomplished and well-proven airliner and this made me think that here we missed a wonderful chance for enhancing British prestige. Surely it would have been worth while to have sent a Comet 4 or a Britannia to a gathering of this importance. Imagine the effect on the assembly if it had been announced that either or both of these aircraft had left London the day before on regular schedule and with a full load of fare-paying passengers and would be back in London again the day after with another full payload when most of the aircraft on show at McCarran were just experimental prototypes!

As it was, the credit stakes were in the good hands of R.A.F. Transport Command. The Comet 2 (in which I made the 11,000-mile return trip to Las Vegas) well and truly upheld our pride with an unrehearsed but well-timed display of short take-off, low fly-pasts, elegant turns and an impeccable landing. The 18,000 trouble-free hours of No. 216 Squadron's Comets were impressed on the spectators by the commentator and this, backed up by the display by Flt. Lt. W. Somers and his crew, earned considerable applause.

These were the highlights of the civil display, although flying by everything from JATO-equipped Dakotas to the new four-engined Grumman Goose gave spectators a full afternoon's pleasure.

Military Might

The scene of the military aircraft flying display was the Indian Springs, U.S.A.F. Armaments Range, a great tract of scrubby, hot, desert land in the shadow of the Rocky Mountains foothills and 40-odd miles north-west of Las Vegas.

About eight crude but adequate stands had been erected for the spectators and clearly marked off for our security and the guidance of the performing aircraft which flew in from Nellis A.F.B. in the suburbs of Las Vegas.

On Sunday, April 12, a dress rehearsal was held for this display and the general public was allowed to go to Indian Springs to watch. I was told that the queue of cars on the road to the range was nearly 20 miles long.

On this rehearsal day I went to the Nellis Base to see the departure and return of participating aircraft and I think it was one of the most impressive sights of military flying I have ever seen. Apart from all the various hangars and aprons scattered round the field I calculated that on the main apron there were more than 400 fighting aircraft assembled. The machines taking part in the display were dispatched at regular intervals. For the whole morning there was a continuous procession of the latest and most exciting aircraft taxi-ing out, taking-off and landing back—a thrilling spectacle indeed even to the hardened spectator of air shows.

I was told that the timing over the Indian Springs target was ± 5 sec., and later, on Wednesday, when I went out to see the show I could well believe it. The commentators were exceedingly good and, I imagined, were practised to a high degree in order to fit in with the timing. As they announced descriptively each event in clear, unhurried tones they concluded by asking the spectators to look to their left or right or front as the case might be and, sure enough, there was the aircraft or formation coming in low and fast—the majority at over 500 m.p.h.—just as had been announced.

It would take far more space than is available here to give a detailed account of all the events which filled the 160 minutes of the show. Suffice it to say that each was spectacular and highly efficient to the greatest degree. Never before have I seen and heard an aircraft in level flight at an altitude of 50 ft. and a distance of 150 ft. go sonic. The F-104, F-105, F-106 and the RF-101 all did this in quick succession, which was pretty shattering.

A little higher, but at about the same distance, a F-104 Starfighter, in the distance of the length of the stands, fired off two HVAR rockets and then immediately destroyed them with its two Sidewinder missiles.

Rocket attacks, Napalm, a mock nuclear attack, and every form of devastating nastiness were thrown into the range target at regular intervals. A B-66 came over throwing out photo flashes by the score, which lit up the desert sky in spite of the intense light of the midday sun.

Teams of aerobats from Nationalist China, Italy, Holland, the U.S.A.F. and the U.S.N. gave some thrilling low-level performances, all on American aircraft, F-86s, F-100s and Grumman Tigers.

This fact made it all the more satisfactory to contemplate the R.A.F. show by No. 617 Squadron's Vulcans. Here we had the only visiting Air Force flying its own national aircraft in its own national markings and I for one felt intensely proud of the fact.

Air Vice-Marshal G. A. Walker and his crews put up a most impressive display and, after a series of fast and slow runs, they introduced a novel finish which deservedly won a spontaneous burst of applause. The formation opened up after a low-level fly-past of the spectator stands to emphasize the size of the four-engined V-bombers and then went straightaway into a near-vertical climb. Within seconds they were visible only as tiny, white triangles in the deep blue sky. The effect was remarkable.

It was a great show and one which could probably only be staged in the sort of place like the Nevada desert. It was also the highlight of the week of the World Congress of Flight.

This year the Congress really featured, in the main, American Air Power. When it comes round again it is to be hoped that the displays and exhibits will be really representative of the civilized part of the World.—C.A.S.

The Fighting Services

Army Air Support Potentialities

LAST week the Army Air Transport Training Centre, Old Sarum, in co-operation with the Army Air Corps Centre, the Joint Experimental Helicopter Unit (J.E.H.U.), R.A.F. Transport Command, units of the U.S.A.F. and French Air Force and aircraft manufacturers, arranged an Army air transport demonstration for 200 officers of the Staff College, Camberley. Held at Old Sarum and R.A.F. Netheravon, the demonstration consisted of a static exhibition of equipment in the morning followed by a comprehensive flying display and limited airborne assault in the afternoon.

Covering the present work (reconnaissance and liaison duties) of the Army Air Corps, the use of helicopters for field engineering, moving underslung tactical loads and troop lifts, the employment of Transport Command in the supply, support and paratroop-dropping rôles and a demonstration of other types of aircraft in Army work, the flying display showed up one outstanding point. This is, with the exception of the Saunders-Roe Skeeter, the Auster, the Chipmunk, the E.P.9 and the Alouette, all the helicopters and fixed-wing tactical support aircraft in which the Army is obviously showing keen interest are out of its reach because of the present weight limitation. Under this, Army pilots under Army command may not fly aircraft of more than 4,000-lb. all-up weight; although this rule will be abandoned if the reported Army order for D.H. Beavers (A.U.W. 5,100 lb.) is confirmed.

Among the types demonstrated in the rôle of Army air support, two of the most outstanding were the Westland Westminster (A.U.W., 36,000 lb.) in flying-crane form, and the Wessex (A.U.W., 12,600 lb.). The Westminster lifted an underslung Army bridging section of 6,752-lb. weight and carried it at between 60-80 knots around the airfield at Old Sarum before positioning it accurately on the ground in a marked square. A Royal Navy Wessex made a number of sorties on to the field at Netheravon, transporting 17 fully equipped Royal Marine Commandos in one lift and a loaded Land Rover, which was underslung, in another.

Both of these helicopters, along with the Saunders-Roe P.531 Mk. 2 (A.U.W., 5,000 lb.), are well outside the Army's weight limitation, but at the same time meet the Service's particular requirements. The Westminster, with its slung-load capacity of 15,000 lb. and 3-hr. endurance, is of special importance for field engineering work, and the P.531 meets the Army's need for a four/five-seat helicopter. The Wessex, capable of a load of 4,000 lb. at ranges up to 40 n.m. or 1,142 lb. for 300 n.m., has approximately 2½ times the payload/range capacity of the Whirlwind and is well suited for Army work.

Photographs copyright "The Aeroplane and Astronautics"

An Alouette in Army Air Corps markings hovering over a Twin Pioneer during the flying display at R.A.F. Netheravon. With an all-up weight of 3,500 lb., the Alouette comes within the Army's aircraft weight limitation.

Other aircraft in the flying display included a D.H. Otter and a Twin Pioneer, both of which demonstrated their respective short take-off, slow-flying and short-landing capabilities, and a Prestwick Pioneer. The Otter is in service with the R.C.A.F. and the U.S. Army and Navy, and both the Pioneer and the Twin Pioneer have been operated by the R.A.F. in the Middle and Far East. J.E.H.U gave a demonstration of the tactical uses of helicopters with its Whirlwinds, showing the quick ground and hover (rope) delivery of troops equipped with heavy machine-guns, mortars and anti-tank guided missiles. The last named can be fired from inside a helicopter.

The demonstration of an airborne assault started with a Transport Command Hastings dropping pathfinder parachute troops who laid DZ markers for the main force. Jumping in two parties, the pathfinders were equipped with sodium marker flares. Made up of 100 troops of the 16th Parachute Brigade, the main force was carried by two Beverleys and jumped as four sticks of 25 men each.

Following the paratroop aircraft, three more Beverleys dropped six medium parachute platforms carrying 1 x 1 ton and 5 x ½ ton vehicles and trailers, and a Hastings came over with a stick of light equipment containers. A U.S.A.F. C-130A Hercules gave a demonstration drop of 8 x 1-ton containers and a French Air Force Nord Noratlas dropped two standard French platforms, one carrying a jeep and the other a mortar. These were followed by three French Army parachutists who made delayed parachute jumps to land very close to their equipment.

Two new transports which were to be in the flying display but were unable to take part at the last moment were a Transport Command Britannia C.1 of No. 99 Squadron and an A.W.650 from Armstrong Whitworth's; another notable military type not on display was the Bristol 192, the most up-to-date R.A.F. transport on show being a D.H. Comet 2.

All helicopter payload figures are based on still-air conditions, I.S.A., at sea level and normal cruise.—P.R.R.

Above, the Westland Westminster "flying crane" rising to demonstrate its carrying capabilities with a standard Army 6,752 lb. bridging section.

Right, a general view of the static aircraft display at Old Sarum which included, left to right, a Transport Command Beverley, a U.S.A.F. C-130A Hercules, and an Auster AOP.9, an EP.9 and a Skeeter from No. 6 Independent Liaison Flight, Army Air Corps.

ASTRONAUTICS and MISSILES

Discoverer II, the satellite launched at Vandenberg on April 13, is now in regular orbit. Its launching was reported last week. The account which follows is by J. R. COWNIE, *a member of our technical team, who was present.*

Eyewitness at Vandenberg

ON Monday, April 13, we flew into Vandenberg Air Force Base on the Californian coast after making an early start from Las Vegas. We were making an unscheduled visit to watch the second launching of the Discoverer satellite series.

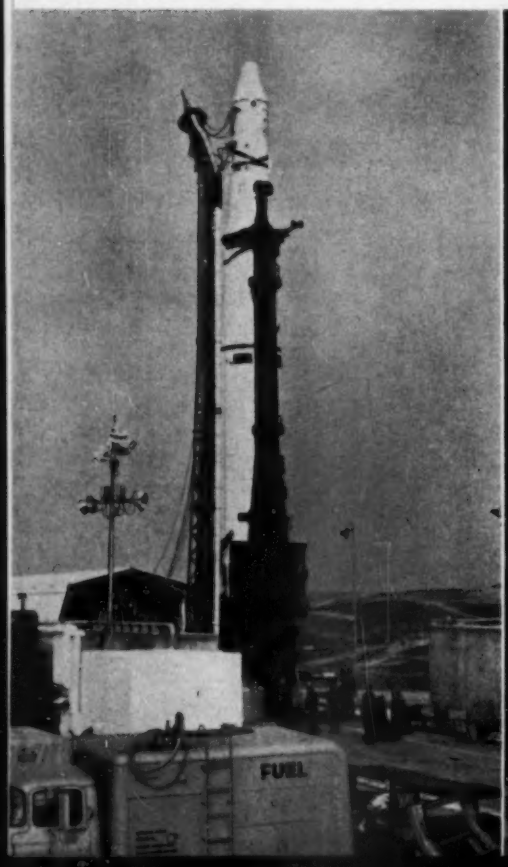
An early arrival at Vandenberg was essential, as Discoverer II was due to be launched at 10.00 hrs. and briefings on the launch were to be given two hours earlier. At this time also the Vandenberg GCA was to be shut down to eliminate any pre-launch interference with telemetry and tracking facilities. Such interference can cause big difficulties—one launch at Cape Canaveral had to be postponed three days because of radio interference which was found to be caused by radio taxis in Atlantic City more than 200 miles away.

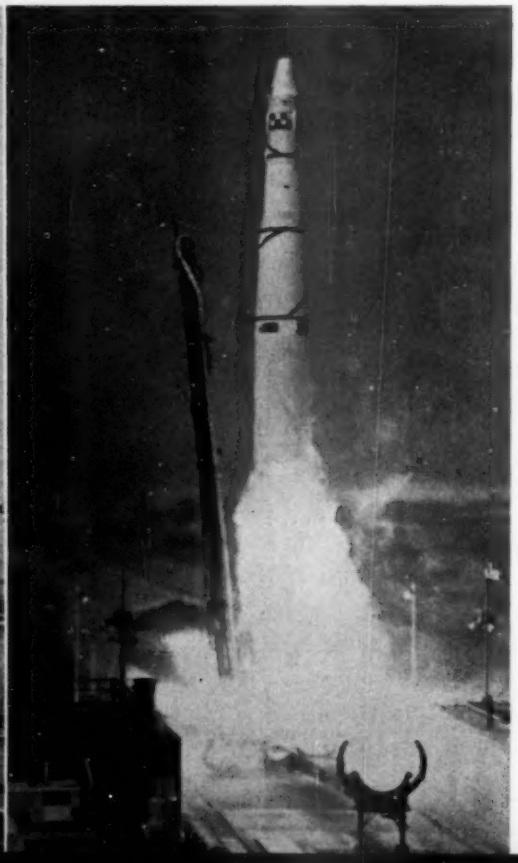
In fact we were lucky—although we were forced to hold near Vandenberg for some 90 minutes, the launch was postponed for an hour and we landed at the missile base just after 09.00 hrs. following a GCA approach. This was a somewhat fearsome experience, as we broke cloud little more than 100 ft. above the ground and the pilot had to make a 15° change of course to line up with the runway.

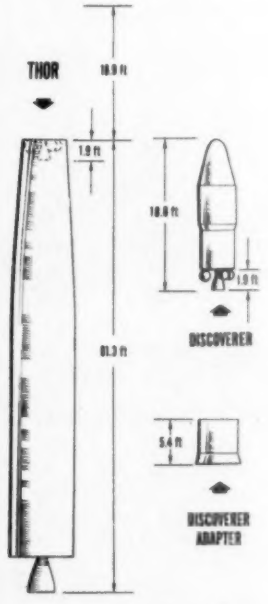
Vandenberg AFB is on the Californian coast in the Burton Mesa area, some 170 miles north of Los Angeles, and extends over 64,000 acres. The area was first developed by the U.S. Army in 1941, when it was known as Camp Cooke and used for training of armoured divisions. It was taken over by the USAF at the end of 1956 for development as a ballistic missile training base and was renamed Cooke Air Force Base in the middle of 1957. This name was changed to Vandenberg Air Force Base in October, 1958.

It is the base of the USAF 1st Missile Division which forms part of Strategic Air Command and is responsible for

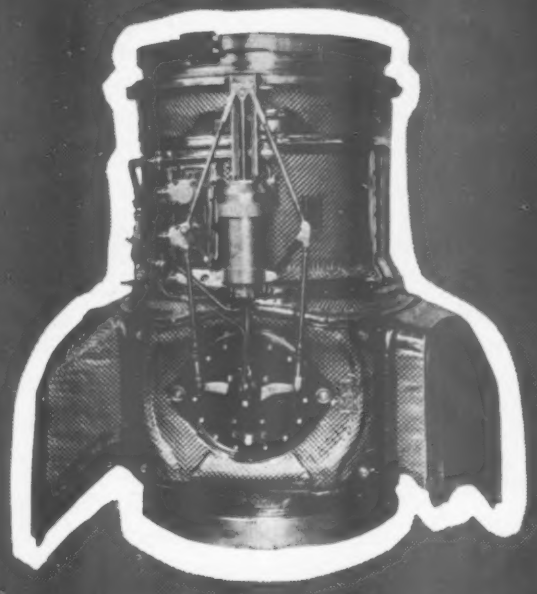
(*Continued on page 527*)







DISCOVERER II.—Three illustrations of the satellite and its launching vehicle. Left and middle, the complete assembly just before and at the moment of launching. Above, a dimensional sketch.



HERMETICALLY SEALED HIGH TEMPERATURE INSULATION BLANKETS

are now being made by Delaney Gallay Ltd. at lower prices than ever before

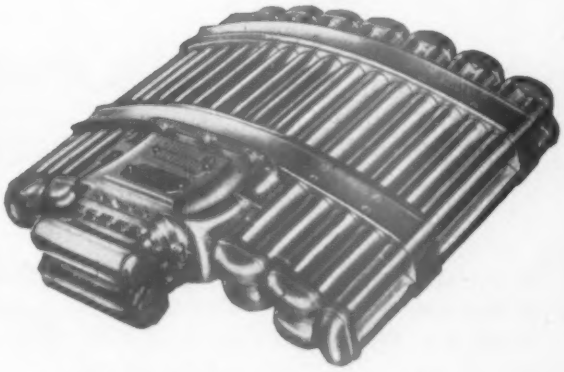
What's more, we don't jib at complicated shapes and fittings, as this blanket fitted to the Rolls-Royce thrust reverser for the D.H. Comet proves.

Our wide experience has enabled us to develop a revolutionary and exclusive method of manufacture that we sincerely believe will enable us to tackle anything.

WE ALSO DESIGN AND MANUFACTURE

High pressure fuel-cooled oil coolers for high performance gas turbine engines. This unit is used in the Armstrong Siddeley Sapphire S.A.7.

Heat exchangers for many purposes in both aluminium alloy and stainless steel. This particular example is for the Vickers Vanguard's anti-icing system. Similar units are being supplied for the Fokker Friendship, the Bristol Britannia, the Armstrong Whitworth Argosy, the Vickers Viscount and the Handley Page Herald.



We shall be delighted to help you with your problems in any of these fields.

Delaney Gallay LTD

Vulcan Works, Edgware Rd., London, N.W.2 Tel: GLAdstone 2201

VISIT US ON STAND No. 127A AT THE PARIS AIR SHOW

NEWEST MEMBER IN A FAMILY OF GREATS

The Canadair-Convair '540', by the application of turbine power, becomes the ultimate development of the widely used and approved Convair 240-340-440 series. The '540' is now on order and in full scale production, and is currently being demonstrated to airlines and business aircraft owners throughout North America.

6 MAJOR REASONS

why the '540' is the new challenger on short-to-medium routes!

1 DEFINITELY LOWER OPERATING COSTS

The standard 48-seat Canadair-Convair '540' offers **a direct operating cost of 1.4¢ per seat mile which comes down to 1.1¢ in the 58-seat configuration.** Over distances as short as 80 miles, its economy of operation matches even that of piston-engined aircraft.

2 GROWTH CAPACITY TO MEET GROWING ROUTE DENSITIES

The Canadair-Convair '540' has the built-in capability of growing with the increased traffic densities that are forecast for the years ahead. It can do this because its **seating capacity can be increased by 20% from 48 to 58 without weight or operating penalty.** All fuel for terminal-to-terminal operation could still be carried.

3 MATCHED-TO-TASK JET-PROP ENGINES

The Napier 3500 e.h.p. engines that power the Canadair-Convair '540' are **the only jet-props specifically designed for the particularly strenuous up-and-down life of short stage operations.** The sectionalized design of these powerful new engines make them singularly easy to service and maintain.

4 REDUCED EN-ROUTE GROUND TIME LOSSES

The Canadair-Convair '540' **eliminates numerous possible time delays at en-route stops:** passenger handling is expedited . . . time consuming engine warm-ups are unnecessary . . . as many as 6 route stops can be made without refuelling.

5 FASTER FLYING, QUICKER CLIMBING

Today's passengers want to **make time.** The Canadair-Convair '540' is **the fastest aircraft in its class,** flying at speeds up to 340 m.p.h. It's off the ground in a flash and takes only 6.4 minutes to climb to an operating level of 10,000 feet.

6 EXTRA CARGO SPACE FOR EXTRA PROFITS

The Canadair-Convair '540' has 402 cubic feet of easily accessible cargo space: enough for **two tons of additional payload** that can be carried with no operating penalty.

MOST IMPORTANT TO YOU: the Canadair-Convair '540' is a product of the combined experience and facilities of two of the world's great aircraft producers—Canadair Limited of Canada and Convair—both members of the General Dynamics family of companies.

THE CANADAIR-CONVAIR '540' WILL SOON TOUR WESTERN EUROPE

For full information about the new aircraft or the tour, please contact our European Representative, J. H. Davis, Princes House, 190 Piccadilly, London, W. 1, England.

CANADAIR CONVAIR 540

JET-PROP AIRLINER

CANADAIR, MONTREAL, CANADA

THE CANADIAN SUBSIDIARY OF GENERAL DYNAMICS CORPORATION CA59-540-22UKT

FOR PROTECTION AT TRANSONIC SPEEDS

CELLON

C.C. (COLD CATALYSED)

RESISTANT
AIRCRAFT FINISH

to D.T.D. 900/R.D. Mat. 4415

Congratulations on their Fiftieth Anniversary to
BLACKBURN & GENERAL AIRCRAFT LIMITED

CELLON LTD. KINGSTON-ON-THAMES, ENGLAND TEL: KINGSTON 1234 (9 lines) *Telegrams: "AJAWB, Phone, Kingston-on-Thames"*
ALSO MANUFACTURED IN AUSTRALIA, CANADA, FRANCE, HOLLAND & NORWAY

CVS-9008

ASTRONAUTICS and MISSILES

(*Continued from page 526*)

the initial operational capability (IOC) with both IRBMs and ICBMs. Jupiter IRBM training is centred in Alabama.

As well as playing a training rôle, Vandenberg will be the first operational Atlas base in the U.S. Launching sites have been built and the first training launches of Atlas are expected within three months.

There has been a vast expansion of the facilities at Vandenberg and a big construction programme is under way. The urgency of its work is obvious to any visitor and no efforts are being spared to bring ballistic missiles into operational service in the shortest possible time.

The training programme is based on IWST (no visitor to the U.S. can avoid talking in abbreviations—this one stands for "integrated weapon system training"). This realistic training includes assembly of the "bird," its maintenance and fuelling and finally a count-down of an actual launch.

Although primarily a training and operational base for missiles, Vandenberg has also been used for launchings in the Discoverer satellite series. These satellites have been launched into polar orbits; the geographical position of Vandenberg makes it much more suitable than Cape Canaveral for such launchings.

When we arrived at the Press centre at Vandenberg we were given full details on the Discoverer II. It was to be launched, it was explained, by a vehicle 78.6 ft. high consisting of a standard Thor IRBM as a first stage and a Lockheed-designed second stage, all of which was to go into orbit.

The first stage was 66.7 ft. long and weighed over 100,000 lb.; it was propelled by the standard 150,000-lb.-thrust Rocketdyne engine of the Thor. Pitch and roll control were provided by a tape-recorder programme with an autopilot for attitude stabilization.

Discoverer II's second stage was 19.2 ft. long and 5 ft. in diameter. Its weight at launch was 8,400 lb. and the orbital weight after the fuel had been burnt was to be about 1,600 lb. Following a coasting period after burn-out of the Thor booster, the second stage was to be propelled into orbit by a Bell Hustler liquid-fuel rocket engine which developed 15,000 lb. thrust and burnt a new high-energy fuel, unsymmetrical-dimethyl-hydrazine (UDMH) with red fuming nitric acid as the oxidizer.

Objectives of the test were given as the study of launching technique, propulsion, communications, satellite stabilization and, possibly, recovery techniques. The total payload put into orbit was to be 440 lb., of which 245 lb. were communications equipment, telemetry and instrumentation; the remaining 195 lb. being the weight of the re-entry vehicle.

The launch was planned from Vandenberg on a bearing of 183°—only 3° west of south. After burn-out of the Thor first stage the stages would separate and the satellite would be programmed into a horizontal position. Radar at Point Mugu, south of Vandenberg, was to track the second stage through its coasting phase and to give the command for both second-stage ignition and thrust cut-off.

Guidance and control systems of the satellite included an inertial reference package, an infra-red horizon-scanning device, a pneumatic jet control system, and a hydraulic control system. The inertial reference package and the pneumatic jet control system, aided by the infra-red horizon-scanner, were to combine to place the second stage in a horizontal position prior to ignition of the Bell rocket motor.

Following second-stage ignition the pneumatic jet control system was to be replaced by the hydraulic system which would gimbal the Bell engine to keep the satellite in a horizontal position as it was accelerated into orbit. During this time the horizon scanner would relay corrections to the second-stage guidance system.

After cut-off of the second-stage motor, the satellite would be stabilized by its pneumatic jet control system which would meter compressed gas under high pressure to external jets which would position the satellite as it orbited the Earth.

If the satellite entered its orbit as planned and was suitably stabilized, an attempt was to be made to recover an environmental capsule which was to be ejected from it. After the satellite was suitably positioned by its stabilization jets, the nose-cone capsule would be separated from it by explosive bolts and springs. Immediately after this a retro-rocket on the re-entry vehicle would be fired to slow it down so that it entered the required re-entry trajectory.

At an appropriate altitude a switch operated by deceleration forces would release parachutes which supported the vehicle during the final phase of its descent. The recovery capsule was 27 in. long and 33 in. in diameter; it weighed approximately 160 lb., including an environmental package and recovery equipment.

The plan was for the capsule to come down near Hawaii and an attempt made to recover it by eight USAF C-119 transports homing on a radio beacon attached to the recovery package. A trapeze apparatus was suspended from the rear of each aircraft and the descending parachute would be snatched by catching its shroud lines on the pick-up gear and reeling it into the aircraft.

Recovery in this way would be possible for about 10 minutes during which time the capsule and its parachute passed through the altitude range of the C-119s. If air recovery failed, U.S. destroyers would be vectored in by aircraft to attempt a sea recovery; the capsule would float and its tracking beacons would continue to work while it was in the water.

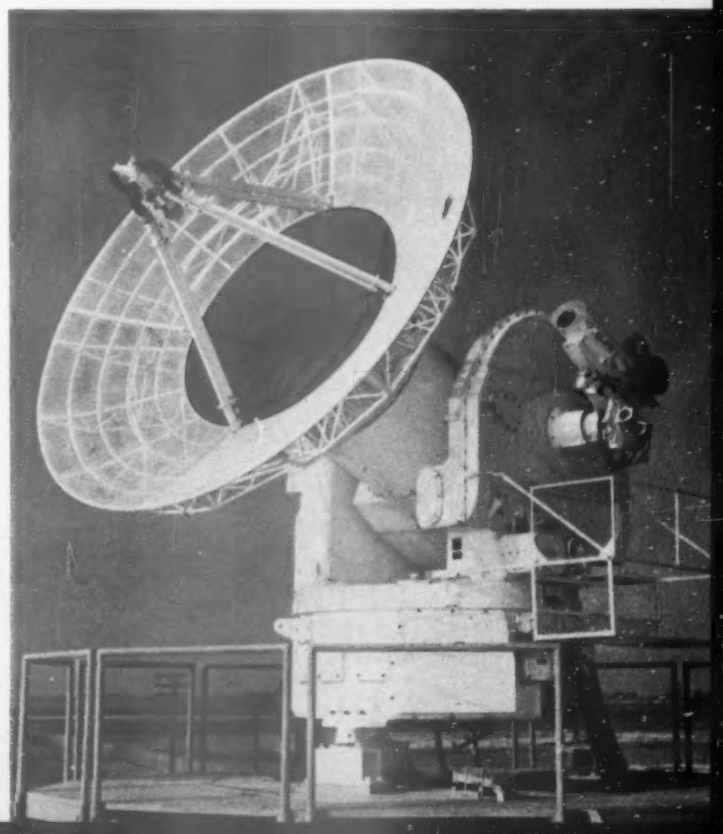
Telemetry and tracking stations for the satellite were at Vandenberg, at Point Mugu, on two down-range telemetry ships and in the 49th and 50th states of the U.S.—on Kodiak and Annette Islands off Alaska and on Kaena Point, Hawaii. Data from all tracking and telemetry stations were to be transmitted to the scientific research laboratory of the Lockheed missiles and space division at Palo Alto, California, where all pre- and post-launch events were monitored and directed.

More than 100 measurements of the satellite's performance were to be radioed back to ground stations over a Lockheed-designed telemetry system. Of these, 34 concerned its stabilization system; 29 were environmental, covering such points as external temperatures and vibration; 18 measured engine performances; 15 were devoted to communication; and nine to the satellite's recoverable capsule. Also carried in the satellite were three film packs as part of an experiment to determine the nature of cosmic radiation in outer space.

Detailed Briefing

At the pre-launch briefing which followed this explanation of the plans, we were told that at 10.00 hr. the launch count down was at T-60 min., but that a hold for weather was expected. Instrumentation for all-weather firing of satellites has not yet been fully installed at Vandenberg, and visual tracking is needed to check that the missiles remain in their programmed trajectory after the launch.

Although Vandenberg is a USAF base, the Pacific Missile Range down which its launchings are made is operated by the U.S. Navy from its Naval Missile Center at Point Mugu. The Range Control Center is at Point Arguello; from there are controlled the aircraft and the high-speed area-clearance boats which ensure that no boats or ships are within the danger area



This AN/FPS-16 precision radar at Point Mugu was used by the U.S. Navy to track Discoverer II up to a range of nearly 300 miles.

during the launching. Experience has shown that once the range area has been cleared it will remain so for about four hours.

Navy support for the Discoverer II launch included the provision of range ships, responsibility for range safety, trajectory information, met. reports, high-accuracy photography, a back-up telemetry van at Vandenberg, radar and optical tracking, and telemetry services.

At this pre-launch briefing Mr. William H. Godel, director of planning of the Advanced Research Projects Agency of the Department of Defence, spoke of the aims of the Discoverer programme. This programme is under the direction of the Agency and is being executed by the USAF Ballistic Missile Division, with the Lockheed Missiles and Space Division as the prime contractor and system manager.

The Discoverer launches were a research and development series aimed at potential military application, said Mr. Godel. The Discoverer II launch was intended to prove the configuration of the vehicle, which was more complex than the first Discoverer launched. The attempt to stabilize the satellite was very important, as this was an essential step towards manned orbital flight. Instrumentation would study conditions in the environmental capsule which would carry animals in later tests.

Mr. Godel put the chances of a successful recovery at perhaps 1,000 to 1. The odds on success were very low; the recovery attempt would be made only if all the thousands of requirements were satisfied. But telemetry should improve the chances of success in later launchings. A full day would have to elapse before tracking and telemetry results showed whether a recovery attempt could be made.

After the briefing we boarded buses and travelled about two miles over the base to our observation point, which was 10,000 ft. from the launching pad. The pad was hidden behind sand dunes, but the upper stage of the vehicle was visible—barely with the naked eye, but clearly through binoculars.

The area was flat, covered in short grass and wild flowers, with occasional belts of tall eucalyptus gum trees. Between us and the launching pad the ground was level, rising only at the edge of the sand-dunes in which the pad was sited. A railway line passed about half-way between us and the launching site.

The day was overcast, but we were told that a break was forecast for 11.00 hrs. This is apparently customary in California with early-morning mist and low overcast coming in from the sea and being burnt off as the sun rises higher.

At 10.44 the launch was at T-30 min. At 10.53 the count-down was at T-21 min. and being held there for an estimated 60 min. because of the weather position.

During this pause Mr. Godel moved round discussing aspects of the Discoverer and other ARPA programmes. He told us that the cost of a Discoverer vehicle was about $3 million excluding its instrument payload. But ways of lowering the cost were being studied—an obvious one was to recover the Thor first-stage booster and use it again. This was perfectly feasible; with this technique studies showed that up to 16 first-stage launches need cost only as much as two when the Thor booster was not recovered.

At 12.45 the count-down was resumed at T-20 min. We were told that at T-11 min. 35 sec. there was likely to be another hold for a weather check. Tension began to rise as the launch time came nearer; 12.50—"T-15 and counting"; 12.52—"T-13 and counting." Then came "T-11 min. 45 sec. and holding." But eleven minutes later the count was resumed.

By this time the sun was out, but there were thin wisps of cloud high in the sky. Beyond the coast was a bank of fine grey mist, but towards the south the sky was clear.

ASTRONAUTICS and MISSILES

At T-2½ there came a "planned technical hold" in the count which brought a slight relaxation of tension. But at 13.16 the hold was released and the count down entered its final stage—"T-120 sec.," "T-60 sec.", "T-30 sec." All stared intently at the distant Discoverer which slowly lifted off the ground and gradually climbed vertically into the sky, belching a red tail of flame which showed much more clearly than the white vehicle itself. Seconds later we heard a dull roar which grew louder as the vehicle climbed higher overhead, becoming a deep crackling roar.

Travelling ever faster, Discoverer II and its Thor first stage rose higher and higher in the sky, turning off very slightly towards the south. Soon the vehicle appeared to be almost above us.

After passing over the sun there was a short time when the vehicle produced a vapour trail—this soon ended, but the orange-red point of light which was the rocket exhaust remained in sight, although growing ever smaller. Engine cut-off came 156 sec. after launch, but it is difficult to be certain that we could see the exhaust up until this point. The last we saw of the vehicle was a narrow white trail, presumably of unburnt fuel emitted after engine cut-off, far above the vapour trail which had turned into a cloud.

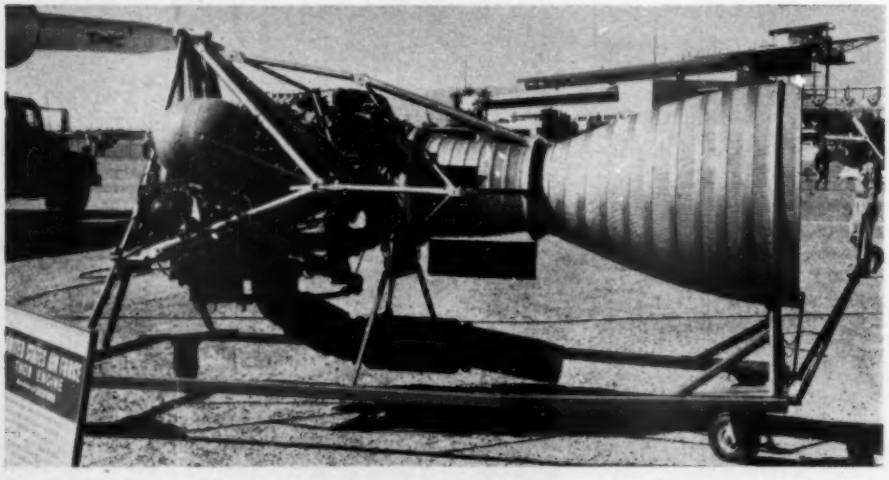
Considerably excited, everyone piled into buses which took us to the news centre. Here stories were frantically filed and, ten minutes after the launch, we were told that the second-stage motor had fired. No further information on the success of the shot could be given until 15.30. The second-stage motor was fired after the vehicle had coasted for 156 sec., following first-stage cut-off.

At 15.30 a jubilant Press conference was held. Discoverer II was definitely in an orbit ranging from 445 miles at apogee to 158 miles at perigee and circling the Earth every 94.2 min.; it was very close to its planned orbit. It was not known whether a recovery attempt could be made, but it was clear that the part of the satellite which remained in orbit would do so for at least 30 days. Preliminary telemetry results suggested that stabilization had been achieved.

More questions were answered about the Discoverer programme. It was an "open-ended" one with perhaps 15 launchings of different configurations scheduled for about one a month. The first Atlas launching in this programme, which is closely connected with the Project Mercury manned satellite programme, would be made from Cape Canaveral.

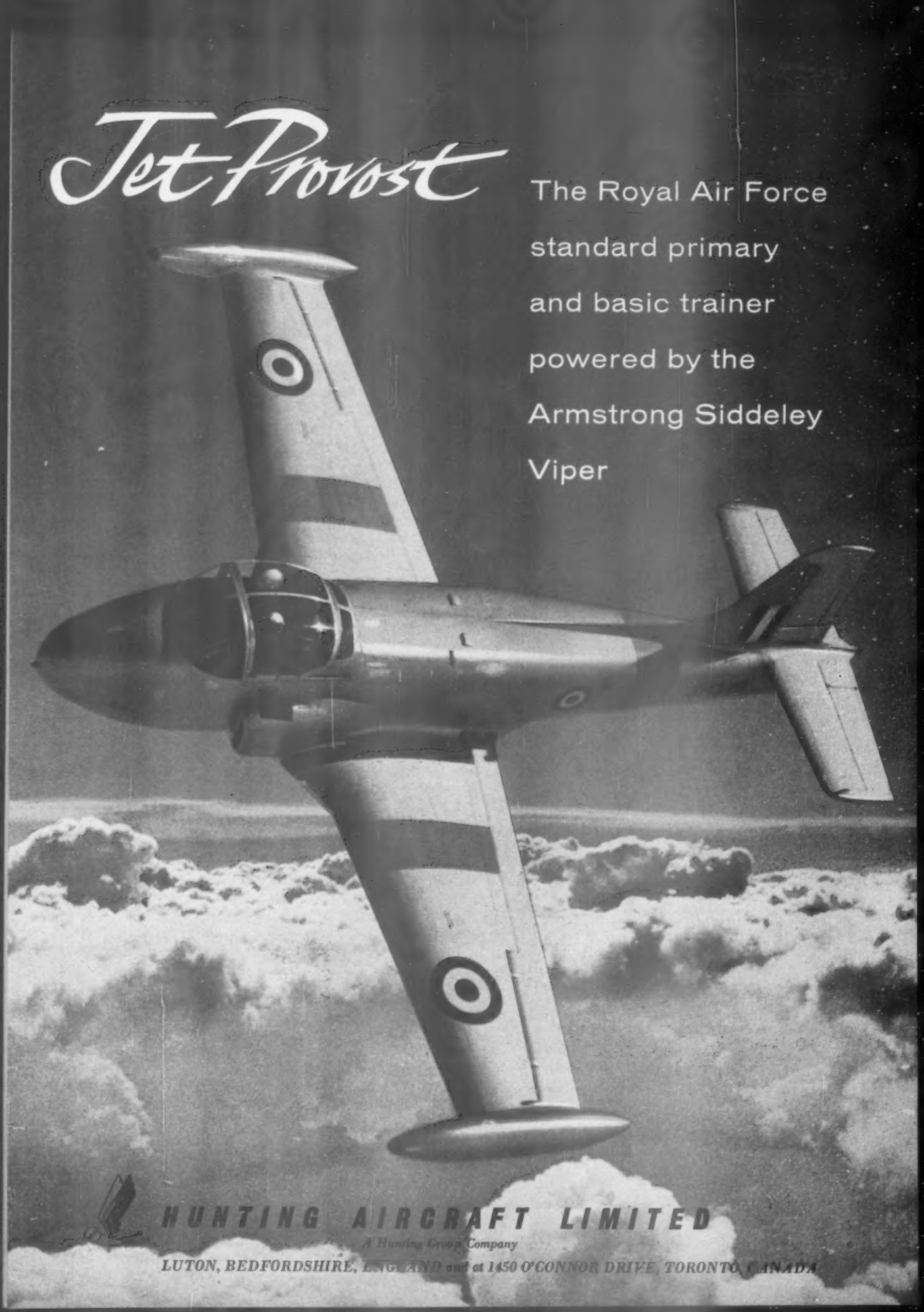
Discoverer II's transmitting frequencies could not be stated—presumably to prevent it being given the re-entry command by mistake.

The day after Discoverer II was launched it was announced that no recovery attempt would be made because a faulty timing device prevented the radio command signal being obeyed. But a built-in timing device in the satellite would eject the capsule on the 17th pass. Unfortunately it would fall far to the north of its intended recovery point near Hawaii. Later reports have said that the capsule landed in the Spitzbergen area.



This Rocketdyne engine, as used in the Thor, was photographed at Las Vegas.

Photograph copyright "The Aeroplane and Astronautics"


Jet Provost
The Royal Air Force
standard primary
and basic trainer
powered by the
Armstrong Siddeley
Viper
HUNTING AIRCRAFT LIMITED
A Hunting Group Company
LUTON, BEDFORDSHIRE, ENGLAND and at 1450 O'CONNOR DRIVE, TORONTO, CANADA

COMET IV radio cooling fan

by AIRSCREW

For over 30 years AIRSCREW have been designing fans for aircraft. This long experience is put to good use in the COMET IV Radio Cooling fan; the latest addition to the long list of fans designed and built by AIRSCREW for most modern British aircraft.

talk to AIRSCREW first for fans

THE AIRSCREW CO. & JICWOOD LTD.

Weybridge . Surrey . England

WP5.89

ESC

As suppliers of
High Quality

Steel Forgings

and

Drop Forgings

we are proud
of our long
association with

Blackburn

AND GENERAL AIRCRAFT LTD

and on their

50th Anniversary

join in offering our congratulations to this organisation which has been responsible for so many outstanding achievements in aircraft and general engineering

ENGLISH STEEL

FORGE AND ENGINEERING CORPORATION LTD

River Don Works, Sheffield

Astronautics Moves Ahead

IN Los Angeles last month, Dr. William Pickering, Director of the Jet Propulsion Laboratory, California Institute of Technology, revealed new details of America's long-term space-programme. The United States, he said, was working on a 260-ft. multi-stage rocket with an initial thrust of 6 million pounds; this would be obtained by clustering four of the 1.5 million lb. thrust engines now being developed by North American Rocketdyne.

Assuming certain technical developments, which he thought would occur during the next 5 to 10 years, Dr. Pickering said that the vehicle—called Nova—" would be able to transport two to three men to the Moon and return them to Earth."

Earlier the National Aeronautics and Space Administration had announced that the rocket would comprise up to five stages using the following systems: (1) the 4 x 1.5-million-lb. thrust Rocketdyne cluster; (2) a single 1.5-million-lb. thrust engine; (3 and 4) liquid oxygen/liquid hydrogen units, and (5) a storable liquid rocket. This potent combination would be capable of launching a satellite weighing 150,000 lb. in a close orbit of, say, 300 miles, or it could orbit 42,000 lb. at 22,000 miles, according to estimates made by NASA.

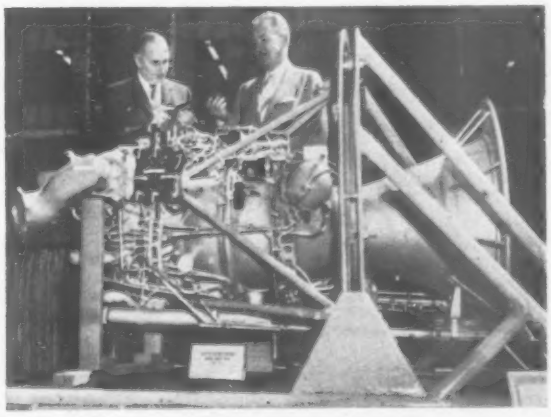
On the subject of guidance, Dr. Herbert York, Chief of Research and Development, U.S. Department of Defence, claimed that techniques capable of landing a man on the Moon would be available as soon as the propulsion units were ready for use. Guidance systems, he said, were already accurate enough to hit " a rather small area on the Moon."

Space-Feeding

One aspect of astronautics that has not received its due share of attention is the space-man's food supplies. How great this problem is likely to be when interplanetary journeys are contemplated can be gauged from the fact that, with current methods, a synthesized diet to provide 3,500 calories per person each day would require 570 lb. of food per man each year.

On top of this there is a minimum requirement of 548 lb. of oxygen each man-year, plus nearly a ton of water. Thus a spaceship making a round trip to the planet Mars—taking more than 3 years—would require over 12 tons of food, oxygen and water for a three-man crew.

One thing we can be quite certain about is that the idea of taking three aspirin-sized pills labelled " breakfast," " lunch " and " dinner " won't do. Even if a pill were perfected combining all the necessary nutritive elements for survival—and, according to the experts, it would be as big as a grapefruit—the psychological burden of this kind of diet stretching over years would be highly dangerous. " A pill-satiated space-traveller thinking of a steak-dinner millions of miles away on Earth would have difficulty in retaining his sanity," say scientists.



The first view of the Thiokol engine for the X-15. Left J. W. Crosby, president of Thiokol, right Harry R. Ferguson, vice-president in charge of Reaction Motors division of Thiokol.

According to Dr. Bernard E. Proctor, head of M.I.T.'s Department of Food Technology, the solution to this problem lies in what is called " sealed ecology." This means that food for future space-flights must first be reduced considerably in size and weight, whilst retaining high nutritive value, and at the same time must be of such a make-up that at least some of the waste-products evolving from it can be regenerated chemically and used again.

The first steps in developing such a process are being taken by M.I.T. under a contract with Wright Air Development Center, U.S.A.F. Air Research and Development Center. The initial objective is to discover food which will take up the least possible room and yet furnish the highest possible energy. Modern discoveries in preservation by thermal or ionizing radiation, use of various forms of algæ, synthetic flavouring, new methods of packaging and a number of other highly technical fields are utilized in this research.

Launched on April 20 at Cape Canaveral this solid-fuel test rocket is a forerunner of the U.S. Navy's Polaris missile.

" Paddle-wheel " Satellite

At the near-end of the NASA space-programme is a project designed to test the characteristics of the forthcoming Venus probes (THE AEROPLANE AND ASTRONAUTICS, April 24, p. 504). This is an Earth-satellite, reported to weigh about 120 lb., which carries solar cells—generating 400 W—in four paddle-like vanes projecting from a 28-in. spherical centre-body. Inside the sphere are chemical batteries which the solar cells will re-charge, providing a continuous source of electrical power for the satellite's instruments and radio transmitters.

The four vanes are 18 in. square and are designed to unfold into a cruciform pattern once the payload is in orbit, upon receipt of a radio-signal. Designed to provide the largest possible surface area, the vanes are angled in such a way that at least one of them will always intercept the maximum amount of solar energy. Artists' impressions of the new project show the term " paddle-wheel " to be somewhat misleading in that the blades are not equidistantly disposed around the axis of the sphere.

Vanguard 1, launched on March 17, 1958, has six solar cells mounted on the surface of the 6.4-in. diameter sphere; this tiny body is still radiating signals after more than a year in orbit. However, whereas the Vanguard satellite has only about 1/200 Watt of transmitting power, the " paddle-wheel " vehicles will radiate far stronger signals which should enable them to " talk back to Earth " over great distances.

Ultimately, it is hoped that the range of communication can be extended as far as Venus at its nearest approach to Earth. In this way it is anticipated that future interplanetary probes will be able to transmit continuous signals at low-power (for tracking purposes) and intermittent signals (for communication) over periods of several hundred days.

Statements issued by NASA in recent weeks suggest that the launching of the first experimental " paddle-wheel " vehicle—which will remain a satellite of the Earth—may be imminent. The launching vehicle, known as Able III, will have a Thor IRBM as a booster, a second-stage Vanguard engine, and a solid-propellent third stage.

It is planned to loft the payload into an elliptical orbit with an apogee of about 30,000 miles and a perigee of 150 to 500 miles. As in the case of the earlier lunar probes, the final stage will be spin-stabilized—at a rate of about two revolutions per second. Instrumentation is said to include an infra-red scanner for viewing from orbit and apparatus for measuring radiation levels in space and the extent of the Earth's magnetic field.

General Aviation News

CAPSULE RECOVERED. — The U.S.A.F. has announced that a small capsule ejected from a Thor IRBM at Cape Canaveral has been successfully recovered from the sea. This is the fourth such recovery from a Thor launching.

POLARIS TESTS.—The sixth "Polaris-configured" test vehicle was fired from Cape Canaveral on April 20 and the U.S.N. announced that "all primary flight objectives were accomplished." Earlier launches had been unsuccessful.

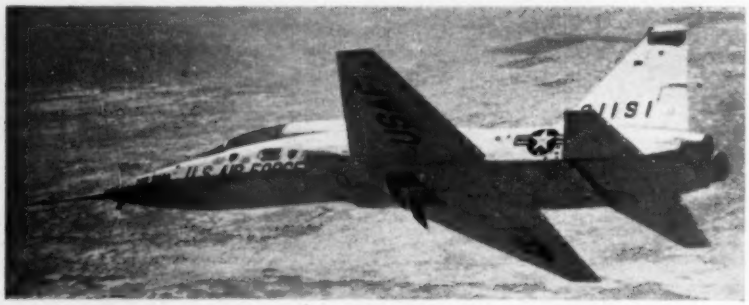
AID BY WOOMERA. — Maj.-Gen. Yates, commanding Cape Canaveral, has said that the Woomera rocket range will play an important part in U.S. attempts to launch a manned space vehicle, using an Atlas missile. Orbits will be chosen to cross Woomera so that radio communications can be maintained.

CONFERRING ON ICE.—A conference on the protection of aircraft from icing will be held, under the auspices of Napier's Flight Development Establishment and the R.A.E., at Luton Airport on June 2. There will be papers from the R.A.E., Bristol Siddeley, Avro, the Sierracin Corpn. of Burbank, Calif., and Lockheed.

AIRBORNE AGAIN. — Mr. Norman Hill's Cierva C-30A Autogiro, G-ACUU, has recently been flying again at Elmdon Airport, Birmingham.

Photograph copyright "The Aeroplane and Astronautics"

BELL XF-109 PROGRAMME.—The U.S.A.F. has withdrawn support for the XF-109 (D.188a) VTOL Mach-2 fighter programme through lack of funds; the U.S.N. withdrew earlier. The Bell company was associated with Convair in forming a joint development team, which may continue the project privately. Rolls-Royce Avon power was to be used.



SPACE-AGE TRAINER.—The Northrop T-38 Talon (two G.E. J85 turbojets) made its first flight on April 10 at Edwards A.F.B. It is to replace the subsonic Lockheed T-33 in the U.S.A.F.

CARIBOU STRETCH. — Production versions of the de Havilland Caribou are to have a lengthened fuselage as well as the recently announced increase in gross weight from 24,000 lb. to 26,000 lb. The fuselage "stretch" is a 45-in. section ahead of the wing, making the total length 28 ft. 9 in. New floor area is 176 sq. ft. and total cabin volume is 1,150 cu. ft. Standard seating is now for 30 passengers or 40 in a high-density lay-out. Freight payload is 7,525 lb. over 200 st. miles. At 26,000 lb., take-off run is 530 ft. and landing run is 535 ft.

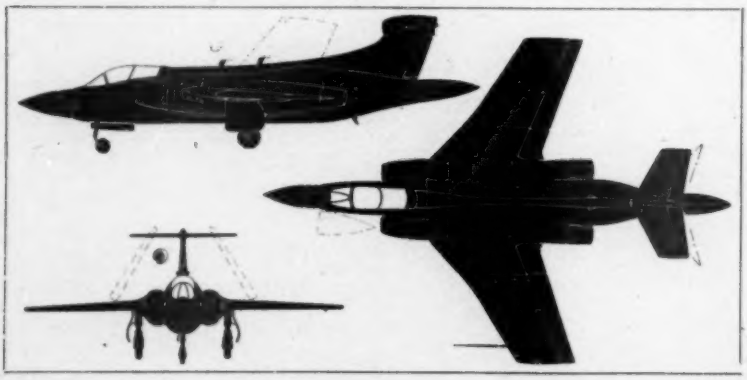
AUSSIE AIRBORNE.—Seen here on its first flight on March 31 is the Millicer Air Tourer, which is to be produced by East-West Airlines, of Tamworth, N.S.W. It was piloted by Mr. L. McPherson, C.F.I. of the Royal Victoria Aero Club.

CIRCUMSPECTION.—An interesting feature of the Sikorsky S-60 flying crane (illustrated in our April 17 issue) is that the pilot's seat is rotatable so that he can face rearwards when the winch is being operated. Two sets of instruments are provided. The S-60 has a five-blade rotor, 72 ft. in dia.; is 87 ft. 11 in. in overall length (fuselage length, 65 ft.), and is 21 ft. 8 in. high over the tail rotor. The ground clearance below the fuselage is 7 ft. 8 in. The rotor system, transmission and powerplants are as used on the S-56, and similar to those of the Westland Westminster. A turbine-powered S-60 is under consideration, possibly with G.E. T64s or P. & W. JT12s.

SCOUT CONTRACT.—A $945,000 contract has been awarded to Chance Vought by the NASA for the integration of the four-stage solid-propelled Project Scout vehicle for putting 150-lb. satellites into 300-mile orbits.

CANADAIR TOURS.—The second Canadair 540 tour began at the end of last month and will cover principal cities in South America. The aircraft making this tour is one of the first two Canadair conversions of Convair 440s, and is registered CF-LMA. According to the latest information from Canadair, this should properly be designated a Convair 540—the name to be used in future for aeroplanes converted to have Eland engines; aeroplanes produced by Canadair from scratch with Elands will be Canadair 540s.

"THE MOTOR" MANUAL.—The 36th edition of this reference work was published by Temple Press Limited on April 22. It costs 10s. 6d. from all booksellers or bookstalls, or 11s. 9d. by post from the publishers at Bowling Green Lane, London, E.C.1.



STRIKER.—First authentic three-view drawing of the Blackburn NA.39, photographs of which are on page 515. Span, 42 ft. 6 in.; length, folded, 50 ft. 7 in.; height, folded, 16 ft. 7 in.

500-km. RECORD.—A new record of 816.279 m.p.h. over the 500-km. closed circuit is being claimed by Capt. G. Edwards, U.S.A.F., flying a McDonnell RF-101 Voodoo at Edwards A.F.B.

CLUB AT READING.—On May 1 the East Bucks Flying Group, which has operated for some years at Denham, moves to Woodley Aerodrome, Reading, and its name has been changed to the Reading Flying Club. It continues to be operated by Nightscale Aircraft Services.

RUSSIAN RECORDS.—Two "load-to-height" records are claimed for the Mi-6 turbine-powered helicopter: five tons to 18,207 ft. and 10 tons to 15,090 ft. On March 12 F. Byelushkin reached a height of 18,379 ft. in an Mi-1 near Moscow. F.A.I. confirmation is awaited.

NEW FROM FRANCE.—The Sud-Aviation S.E.3200 general-purpose helicopter powered by three Turboméca Turmos. It can carry up to 30 passengers at a cruising speed of 150 m.p.h.

Commercial Aviation Affairs

MOSCOW SERVICE.—In preparation for the start of London-Moscow services on May 14, B.E.A. made a proving flight leaving London on April 21 and returning on April 23. The Viscount carried 20 B.E.A. representatives led by Lord Balfour of Inchrye. The service will be operated twice weekly via Copenhagen using mixed-class 806s. Aeroflot will fly reciprocal services with Tu-104s and is expected to fly the first on May 13.

NO P.A.A. NOCTURNE.—Following the M.T.C.A.'s refusal to allow night jet operations at London Airport, Pan American amended its new 707 schedules so that the second daily service to New York, started on April 26, leaves at 13.30 hrs. instead of 01.30 hrs. as at first planned. Announcing this change in plan, Pan American point out that passengers will "now have the opportunity of booking every day, two highly desirable daylight Jet Clipper flights to the U.S.A."

707 TESTING.—In F.A.A. certification tests with the Boeing 707-320 Intercontinental, which began 35 days after the first flight, accelerate-stop tests have been made at weights up to 315,000 lb.-4,000 lb. above the initial certification weight.

SKY LINER.—This mock-up of the 25-passenger Sikorsky S-61 (three G.E. T58-6 turbines) will be seen at the forthcoming Paris Aeronautical Salon.

MUNICH AFTERMATH.—An independent assessment will be made of the question of whether the captain of the Elizabethan involved in the Munich accident should have his licence withheld for a "suitable period." A final decision will be made by the Ministry of Transport in the light of this review.

PERSIAN DECCA.—The Persian Gulf Lighting Service has placed an order for the supply and erection of two Decca Navigator Chains in the Persian Gulf. The chains will be brought into operation at the end of the year and will provide a continuous navigational service, primarily for shipping.

B.O.A.C./MORTON LINK.—B.O.A.C. and Morton Air Services, Ltd., have concluded an interline agreement for the linking of Morton flights between Rotterdam and London with B.O.A.C. services. In particular the agreement will provide for speedy connections with B.O.A.C.'s fast transatlantic Comet and Britannia flights for travellers to and from Rotterdam, by means of ground transport between Croydon and London airports. By the middle of May, Morton Doves and Herons will be providing three services daily on the Rotterdam route.

GULFSTREAM APPROVED.—After seven months flight testing, the Grumman Gulfstream has been provisionally certificated by the F.A.A., permitting the start of crew-training and service/maintenance programmes. The first Gulfstream has completed over 200 hours, and production at the rate of three a month is proceeding; target is to fly 27 by the end of this year.

CARAVELLE INAUGURATION.—A S.A.S. Caravelle flew a special inaugural service between Copenhagen and Baghdad on April 26, over the route which it will use regularly from May 15.

T.C.A. MOVE.—Trans-Canada Air Lines moved across to London Airport Central on April 24 and is the first transatlantic airline to move away from the North side. The airline is using Channel 4 in the central terminal building.

RURAL AIRLINE.—Aerochaco Lineas Aereas Chaquenas will begin operating a new air passenger, cargo and mail service in the provinces of Chaco and Formosa, Argentina, in August, with two de Havilland Beavers. A third Beaver will be added early in 1960. This new venture, jointly capitalized by the provincial (Chaco) government, together with the Chaco Aero Club, will initially serve seven communities from the provincial capital, Resistencia.

CUBAN BRITANNIAS.—The two Britannias delivered so far to Cubana are now flying three services a week each between Havana and Mexico City and between Havana and New York. Mean passenger load factor on the New York run was nearly 80%. Frequency of the New York service is to increase to seven a week when the third aircraft is delivered.

B.K.S. IN LEEDS.—A new air terminal has been opened by B.K.S. Air Transport at the back of the Griffin Hotel in Leeds for passengers using B.K.S. services at Leeds/Bradford Airport. A new service from this airport to Rotterdam and Basle will start soon, and a service to Dublin is planned.

FREIGHT SERVICE INCREASE.—Seaboard and Western Airlines increased its transatlantic freight and mail service to two flights daily (except Sundays) on April 21. The 13 round flights each week will make available a capacity of 234 tons in each direction between New York and Western Europe.

EKCO INTEREST.—The Lord Mayor of Coventry, the manager of Baginton (Coventry) Airport and the airport committee last week flew to Southend in the Ekco Avro 19 to inspect that company's airfield approach aid and VHF direction-finding equipment.

SOVIET SALES.—Following the supply of a number of Aero 45s from Czechoslovakia to the Russian airline Aeroflot, for charter-type transport, the first Morava L-200 light twins have been exported to the Soviet Union.

B.E.A. IN THE CITY.—B.E.A. has opened a small sales office at 102 Cheapside, E.C.2, to cater for business travellers and city workers planning holidays by air.

VARIG CARAVELLES.—The Brazilian airline Varig will put its Caravelles into service between Sao Paulo and New York in September.

ICAO MEMBER.—The Republic of Guinea became the 74th member state of ICAO on April 26.

BRITANNIA SEATING.—Bristol Britannias operating the C.P.A. domestic service in Canada, which starts on May 4, will accommodate 51 tourists and 38 (not 58, as we said on April 10) first-class passengers.

News About People

FILTON CHANGES.—In order to devote themselves exclusively to their duties as executive directors of Bristol Siddeley Engines, Ltd., Dr. S. G. Hooker and Air Cdre. F. R. Banks have resigned from the board of the Bristol Aeroplane Co., Ltd. In a recent note regarding the award of the C.G.I.A. the date of Air Cdre. Banks' birth was incorrectly given. He was born in 1898.

LINK DIRECTION. — Mr. Norman Hill, who recently joined Air Trainers Link, Ltd., of Aylesbury, as head of the sales division on the resignation of Mr. L. Malec, has been appointed a director of the company.

HELICOPTER PEOPLE.—Mr. N. E. Rowe, C.B.E., D.I.C., B.Sc., is to become president of the Helicopter Association of Great Britain on June 5 in succession to Mr. Eric Mensforth. The Association also announces that the 1958 Cierva Memorial Prize of £50 has been awarded to Mr. E. R. Kendall, of Saunders-Roe, Ltd., for his essay, "Is Man-powered Rotating-wing Flight a Future Possibility?"

S.-R. POST.—Mr. Richard Stanton-Jones, M.A., D.C.Ae., 32, has been appointed chief designer (fixed-wing aircraft) of Saunders-Roe, Ltd. He has been with the company since 1950.

HERALDING BUSINESS.—During the sales tour of the Handley Page Dart Herald in India, Mr. Krishna Menon, Mr. Majithia, and Mr. Reddi flew in the aircraft, as did Navy and Air Force chiefs, the Director-General of Civil Aviation, and Air Cdre. Lal, general manager of Indian Airlines Corpn. The Dart Herald is due at Colombo on May 2 to be seen by Air Ceylon and the Ceylon A.F.

McKEE TROPHY. — Mr. Janusz Zurakowski, until recently chief test pilot of Avro Aircraft, Ltd., has been awarded the McKee Trophy for his outstanding contribution to Canadian aviation.

CLUB SUGGESTIONS.—The A.B.A.C. has now announced the prize-winners of the suggestion competition on "What should be done to make the flying club, air centre and flying group movement more interesting and of greater benefit to the members." First prize (£10), Mr. P. C. Rumsey (Surrey and Kent F.C.); second (£5), Miss J. L. Ferguson (Denham F.C.), and third (£3), Mr. D. C. Perch (Croydon F.C.). Their suggestions have not yet been announced.

BROUGH POST.—This is Mr. A. F. Jopling, chairman of the new Blackburn Electronics, Ltd. We regret that the portrait which alleged to be of him in our issue of April 17 was not in fact so.

MASTER PILOTS. — GAPAN has awarded Master Air Pilot Certificates to Capt. A. Caesar-Gordon, D.F.C., D.F.M., B.E.A. route check captain; Capt. P. Sleight, D.F.C., senior captain with B.O.A.C.; and Capt. A. N. Werner, B.E.A. training captain.

R.A.F. APPOINTMENT.—Air Cdre. P. H. Dunn, C.B., C.B.E., D.F.C., is to become Deputy Air Secretary at the Air Ministry on May 1, with the acting rank of Air Vice-Marshal. Since July, 1958, he has been Director of Personnel (Air), before which he was Commandant of the R.A.F. Flying College, Manby.

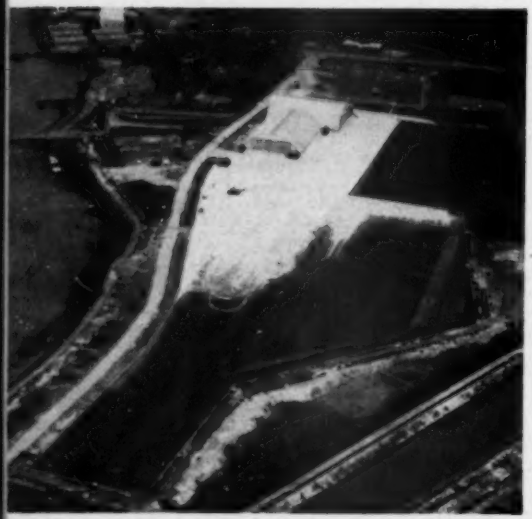
T.W.A. APPOINTMENT. — Mr. Edward Reseigh has been appointed a sales representative for Trans World Airlines in London. He joined T.W.A. in July, 1956, and has been employed in the airline's Piccadilly headquarters.

Military Aviation Affairs

BULLPUP IN SERVICE.—The U.S.S. "Lexington" has become the first U.S. ship to deploy for fleet duty armed with the Martin Bullpup ASM. The type is carried by the North American FJ-4B and the Douglas A4D Skyhawk. The Bullpup is shortly to be deployed on U.S.S. "Saratoga."

TRAINER DESIGNATION. — Auster T.10 is the designation allocated to Mk. 6 AOP aircraft modified as near as possible to T.7 standard.

SASSOON CUP.—The 2nd T.A.F. Sassoon Challenge Cup Aerial Photography Competition for 1959 has been won by No. 79 Sqn. (Swift FR.5s), R.A.F. Gutersloh, with 4,425 points out of 5,000, a margin of less than 1% ahead of the runners-up, No. 17 Sqn., of Wildenrath. No. 2 Sqn. at Jever was third with 3,769 points. This year the competition was based on the Command's concept of low-level reconnaissance.



CARIBBEAN VISIT.—Three Shackleton MR.3s of No. 120 Sqn., Coastal Command, are undertaking a training and liaison flight in the Caribbean area. Under the command of Wg. Cdr. L. G. A. Read, the Force is visiting Bermuda, Jamaica and British Honduras and is due to return to the U.K. on May 5.

THUNDERCHIEF CHANGE. — The U.S.A.F. has changed its order for the Republic F-105E two-seat all-weather fighter-bombers to an equal number of F-105D single-seaters. Production of the F-105B single-seater ends this year. U.S.A.F.E. is to be reinforced with Thunderchiefs in the autumn.

ARCTIC MISSILES.—The R. Swedish A.F. is proposing to establish a missile-testing region in Northern Sweden (43 miles by 19 miles) between the Pite and Lilla Lule rivers.

MISSILE BASES.—The U.S. Army announced on April 16 that it will start building nine ICBM bases in the U.S.A. this year, at a cost of £107,140,000. They will be for Atlas and Titan missiles.

PORTLAND OPENING.—The C.-in-C. Portsmouth, Admiral Sir Manley L. Power, K.C.B., C.B.E., D.S.O., formally opened the R.N. Helicopter Station, Portland, on April 24. The station forms part of H.M.S. "Osprey" and is to be used as an Operational Flying School. No. 815 Squadron is stationed there.

TRANSGLOBAL.—This Avro Shackleton MR. 3 of No. 201 Squadron, St. Mawgan, is to make a round-the-World flight. Seen here is the crew, with the captain, Wg. Cdr. J. Roberts, D.F.C., D.F.M., who is C.O. of the Squadron, on the extreme right.

UTILITY DESIGNATION. — Cessna 310 light twin-engined transports now in service with the U.S.A.F. are designated U-3A, in the Utility category. Other aircraft in this designation series are the U-1A Otter and the Lockheed U-2 meteorological research aircraft.

ARCTIC FLYING. — Ski-equipped C-130 Hercules of the 314th Troop Carrier Wing are to be landed on the Greenland Icecap during U.S.A.F. Tactical Air Command training operations this summer.

ORDER COMPLETED.—The last two of 68 Sea Hawks built by Armstrong Whitworth for the West German Marineflieger were delivered on April 21.

. . . . . where air transport is an essential part of the life of the community.

The Dart Herald branchliner is a modern propjet which is cheap to buy and cheap to operate. Powered by Rolls-Royce Darts, it carries up to forty-seven passengers, more than five tons of freight or combinations of both. Its exceptional structure makes possible years of dependable service.

The Dart Herald's speed, substantial range with full load and ability to use small airstrips with indifferent surfaces mean that it is the only aircraft ideally suited to local services and rapid inter-city flights.

DART Herald

Engines: Two Rolls-Royce Dart Propjets

HANDLEY PAGE
RADLETT · LONDON · READING

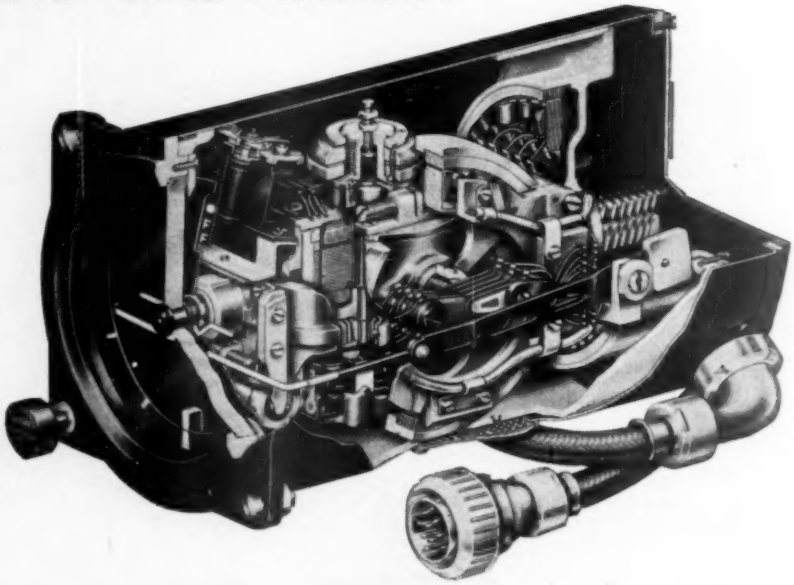
H.L.7

(MARK 3D)

THE MOST ADVANCED

GYRO HORIZON

FOR MILITARY AND CIVIL AIRCRAFT



Following extensive trials, using photographic methods of recording errors, the performance of the Sperry H.L.7 (Mark 3D) Gyro Horizon in high-speed fighter aircraft has proved to be superior to that of any similar instrument subjected to this type of flight evaluation.

Also designated as H.G.3 when fitted with a potentiometer signal system on the roll and pitch axes.

SPERRY

GYROSCOPE COMPANY LIMITED

GREAT WEST ROAD, BRENTFORD, MIDDLESEX

Correspondence

Sic Transit . . .

AS one of the old Croydon contingent I feel as many other people do that with the closing of Croydon we have lost an old friend.

What is going to happen to people like us in the future, struggling up the Redhill valley praying we shall catch a glimpse of the Croydon Gas Works! I am afraid the answer is "No more Le Touquet that way."

As a matter of interest I have found while browsing through my log books that during the period 1920-58 I have landed at Croydon on 68 different types of aircraft; the first landing being on a Renault-Avro and the last being a Miles Gemini.

Considering the thousands of hours on four-engined aircraft I have flown in and out of Croydon between these two landings, it seems rather like the Rise and Fall of an Empire.

Perhaps at least we might salvage the tarmac and control tower as a heliport

In checking up the number of types I have flown between 1917 and 1959 I find it totals 110. I wonder if anyone has as many?

London, W.1. A. B. H. YOUELL.

Those Six Junkers Ju 252s

I HAVE been following with great interest the exchange of information concerning the Junkers Ju 52 series of aircraft. I have over the past few years done considerable research into German aircraft of the Second World War. It seems odd to me that to date no one has mentioned the Ju 252. The Ju 252 was a larger and more streamlined version of the earlier Ju 52/3m. There were, I believe, only six built. They were powered by three Junkers Jumo 211 V-12 liquid-cooled engines.

If any of your readers have any further information concerning this aircraft, and especially what became of these six after the War, I would appreciate hearing from them very much.

Adrian, Mich., U.S.A. ALAN C. KING.

The First Control Tower?

WHERE was the first control tower? I don't remember them at R.F.C. or R.A.F. airports during the Kaiser's War. The first I remember was at Croydon on the old Plough Lane side which "just growed" like Topsy after the airport began operations on April 1, 1920.

There may have been a control tower at the first London Airport on Hounslow Heath which came into use on August 25, 1919, and ceased on March 31, 1920, but I don't remember it, nor do I remember one at Le Bourget until after the Croydon one came into use.

London, S.W.5. GEOFFREY DORMAN.

Aero Inns

WITH reference to the first item in H.J.C.'s Club Commentary in THE AEROPLANE for April 10 you may be interested to know that there is a public house called "The Propeller" in the vicinity of Croydon Airport. It is situated adjacent to the crossing of Purley Way by Stafford Road.

The house named "The Startled Saint" surely is near R.A.F. West Malling and not at Biggin Hill.

London, N.18. DR. I. H. GORDON.

[Our correspondent is quite right—"The Startled Saint" is near West Malling. The inn near Biggin Hill is "The White Hart" at Brasted.—ED.]

Historical References

THANK you for your co-operation in helping me to get a photograph of Louis Blériot's landing at Dover, via your open correspondence column.

I have now obtained one from Hulton's Picture Library. My thanks also to Mr. J. Gilbert in the open columns of THE AEROPLANE for April 10.

Longford, Glos. L. J. GUDGEON BAYLISS (Sqn. Ldr., retd.).

Front and Rear (Loading)

WITH all due respect to the A.W.650 Argosy I cannot, in all fairness, agree with the caption accompanying the excellent photograph on page 357 of your March 20 issue. The caption states that "the A.W.650 is, we believe, the only aircraft so far built in which full-width fore-and-aft loading facilities are simultaneously available."

Without necessarily "splitting hairs" re your caption, I would suggest that the Douglas C-124 Globemaster II Series could fairly claim the above-listed "first"! But, of course, it must be admitted that *rear loading* on the C-124 is by a power-operated platform (similar to that used on the earlier C-74 Globemaster I Series).

For the record, the prototype C-124 first flew on 27.11.49 while the 447th and final production C-124 was delivered to the USAF (by Douglas Long Beach's plant) on 5.6.55.

Nairobi, Kenya. DENNIS M. POWELL.

Groundabout

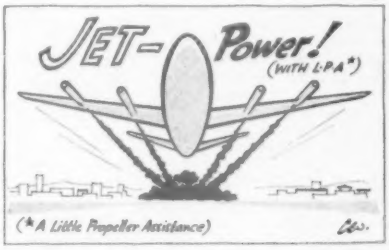
Any Questions? Following this column's recent speculation on the probable cost of the defunct B-36, an American friend writes to point out that all such figures are strictly paper stuff, worked out in this way:

"The Government (yours and mine) buys defense items with tax moneys. When a manufacturer gets paid for an aircraft, he pays his employees and suppliers who in return pay THEIR employees and suppliers, *ad infinitum*. All of them pay taxes and spend what's left with other firms who pay taxes. This tax money then goes back to the Government to buy more aircraft. If it didn't, the aircraft plants would have to shut down and a lot of tax-paying citizens would have to go on relief, costing the Government still more.

"If defense costs keep rising, the Government will probably have to raise income taxes to meet defense needs, the cost of which is rising because wages and salaries have to be raised to enable people to pay the rising cost of income taxes. Now the reason we need so much defense is because we have to defend the vital plants making the equipment needed to defend them. We build ICBMs because the threat of them will act as a deterrent against an attack on the plants where we make the anti-aircraft and anti-missile weapons we need to defend the plants where we build the ICBMs."

*

On the Jet Wagon. Capital Airlines have been told by the CAB that the term "Jet-powered" may only be used in advertising if they also admit the shameful fact that their Viscounts are fitted with propellers. I wonder how *this* set-back will be countered.



*

Atcherley Back to Scratch. Air Marshal Sir Dick Atcherley sends me this nostalgic design for his new crest. Latin is Greek to me but at a guess I'd translate his motto as "No more in the air—doomed to the tarmac" or, more simply, "Grounded." Perhaps Norman "Turbulent" Jones could produce an outsize job for Dick to race around the pylons, although I doubt whether the eager aeronaut would take kindly to being a limit man.

by Lorenz

NOTES AND EVENTS

GOLDEN JUBILEE. — To commemorate the 50th anniversary of the Air League of the British Empire, referred to in our issue of April 17, a 24-pp. booklet entitled "The Story of the Air League, 1909-1959" has been published. It costs 1s. (1s. 4½d. by post) and is obtainable from the Air League offices, 19 Park Lane, London, W.1.

AIRCRAFT TITANIUM. — Imperial Chemical Industries, Ltd., has published a new, well-illustrated leaflet, describing the various grades and applications of its commercially pure titanium, entitled "I.C.I. Titanium for Aircraft."

FILMS FOR HIRE.—The Petroleum Films Bureau, of 29 New Bond Street, London, W.1, has just issued a new catalogue of 16-mm. and 35-mm. films, containing some 230 titles. Films are lent free to flying clubs, Services establishments, etc. The catalogue is available from the above address.

PERFORMANCE GUIDE.—E.M.I. Electronics, Ltd., is supplying an Emiac analogue computer to Sir W. G. Armstrong Whitworth Aircraft, Ltd. The computer, priced at over £55,000, will be capable of studying the performance of complete new guided weapons or aircraft systems.

EKCO RADAR FOR M.E.A.—Middle East Airlines have placed an order with Ekco Electronics, Ltd., to supply Ekco Type E160 airborne search radar equipment with Doppler drift-measurement facilities for their Viscount fleet.

PYE ORDER.—The Belgian Congo Government has ordered Pye ILS for installation at both Elizabethville and Leopoldville airports. The contract for the two installations is valued at £60,000.

NEW RANGE.—Avica Equipment, Ltd., is developing a new series of all-stainless-steel support clips for aircraft and guided-missile applications. An extension to the company's existing range, the new clip is for applications involving extremes of temperature and corrosive environments.

SEARCH RADAR. — Following the success of Ekco airborne search radar in Comet 4s, B.E.A. has ordered Ekco Type E160 search radar for its six Comet 4Bs now under construction at Hatfield.

ELLIOTT EXHIBITS.—Among the items to be shown by Elliott-Automation, Ltd., at the forthcoming International Transistor Exhibition (Earl's Court, May 21-27) are aircraft communication and navigation equipment, and the company's air data system. Exhibits include the Type E-RCB-2 sub-miniature radio compass and units of the Elliott 21-Series lightweight VHF communication and navigation system.

EXECUTIVE DOVE.—The Pressed Steel Co., Ltd., of Cowley, Oxford, has acquired a D.H. Dove 2B, G-AOFI, for executive duties between Kidlington, Renfrew, Swindon and Swansea. With it here are Mr. H. R. Edwards (left), and Mr. M. A. H. Bellhouse.

WEST COUNTRY EXPANSION. — A new factory is planned for Bristow Helicopters, Ltd., at West Hendford, near Yeovil, to be used as an overhaul base for the company's helicopters, sub-contract work and light engineering. At present Bristow Helicopters are at Henstridge.

FLUORESCENT MARKINGS.—The Minnesota Mining and Manufacturing Co., 3M House, Wigmore Street, London, W.1, has produced a fluorescent Scotchcal film having all the essential characteristics of aircraft fluorescent marking paint. Having a pressure-sensitive adhesive backing, the Scotchcal film can be applied to any clean, smooth surface, including aluminium and doped fabric. It can be printed by the silk-screen process to carry airline company emblems or wording and is durable at high speeds.

Aviation Calendar

May 2.—British Interplanetary Society lecture, "Inertial Guidance and its Applications to Astronautics," by D. J. Cashmore (English Electric), at Caxton Hall, **London,** S.W.1, at 18.00 hrs.

May 2.—National Rally organized by the Duke of Bedford and the R.Ae.C., at **Woburn Abbey,** Beds.

May 5.—R.Ae.S. lecture, "The Potential Use of Aircraft for Agricultural Purposes," by R. H. Scott, in the library, 4 Hamilton Place, **London,** W.1, at 19.00 hrs.

May 5.—**R.Ae.S.** Luton Branch lecture, "Aircraft Carriers," by J. C. Lawrence, in the Napier senior staff canteen, **Luton Airport,** at 18.15 hrs.

May 6.—R.Ae.S., Weybridge Branch A.G.M., at the Vickers-Armstrongs (Aircraft), Ltd., sports pavilion, at **Byfleet,** at 19.00 hrs.

May 6.—Kronfeld Club talk, "Met. for the National Gliding Championships," by W. Wallington, at 74 Eccleston Square, **London,** S.W.1, at 20.00 hrs.

May 7.—R.Ae.S. Cambridge Branch lecture, "Some Aspects of Blind Landing Techniques," by W. J. Charnley, at University Engineering Laboratories, **Cambridge,** at 20.15 hrs.

May 8.—Helic. Assn. of G.B. lecture, "Helicopter Noise Suppression," by H. B. Irving in the R.Ae.S. Library, 4 Hamilton Place, **London,** W.1, at 18.00 hrs.

May 8-10.—Channel Islands international air rally at **Jersey Airport.**

May 9.—U.S.A.F. "At Home," at R.A.F. **Weathersfield,** Essex.

May 9-10.—British Women Pilots' Association flying week-end, at **Snoring Aerodrome,** Fakenham, Norfolk.

May 9-10.—National Glider Trade Fair, at **Lasham Gliding Centre,** near Alton Hants.

May 9-18.—National Gliding Championships, at **Lasham Gliding Centre,** near Alton, Hants.

May 10.—International helicopter rally, at **Woburn Abbey,** Beds.

May 11.—R.Ae.S. Halton Branch lecture, "Some Aspects of Nuclear Propulsion," by Sqn. Ldr. G. R. Candy, at the Branch H.Q., R.A.F. **Halton,** at 18.45 hrs.

May 11.—R.Ae.S. Glasgow Branch lecture, "Philosophy of Gas Turbine Design," by D. L. Brown, at the R. College of Science and Technology, **Glasgow,** at 19.15 hrs.

May 13.—R.Ae.S. Chester Branch A.G.M. and film show, in the lecture theatre, Grosvenor Museum, **Chester,** at 19.30 hrs.

May 13.—R.Ae.S. Southend Branch lecture, "Space Travel," by Dr. G. S. Brosan, at the Labour Hall, Boston Avenue, **Southend,** at 19.30 hrs.

May 14.—R.Ae.S. 47th Wilbur Wright Memorial Lecture, by C. J. McCarthy, at the Inst. of Mech. Engineers, Birdcage Walk, **London,** S.W.1, at 18.00 hrs.

EPOXIDE RESINS.—Bakelite, Ltd., has announced the publication of Advance Information Sheet E.32 which gives full details of three new low-cost epoxide-resin hardeners now being marketed by the company. Copies, which give typical characteristics of the systems and a number of suggested uses, are available direct from the company at 12 Grosvenor Gardens, London, S.W.1.

CHANGE OF NAME. — The Mechanical Engineering Research Laboratory at East Kilbride will in future be known as the National Engineering Laboratory. It is part of the D.S.I.R. organization and financed from public funds.

VICTOR CONTRIBUTOR.—Omitted from the list of contributors to Handley Page Victor production in our issue of March 27 was the name of E. and E. Kaye, Ltd., of Ponders End, Enfield, Middx. This company supplies Durcilium aluminium-alloy bars, tubes and sections for airframe, wings and interior fittings.

PERSONAL NOTICES

BIRTHS

Boyle.—On April 3, at the R.A.F. Hospital, Wegberg, Germany, to Lillias, wife of the Rev. Ronald Boyle—a daughter.

Broom.—On April 13, at Bognor Regis, to Mollie, wife of Flt. Lt. C. J. Broom—a daughter.

Burton.—On April 14, at R.A.F. Hospital, Jever, Germany, to Diana (*née* Lewis), wife of Flt. Lt. D. E. Burton—a son.

Capes.—On April 14, at R.A.F. Hospital, Wroughton, to Christine, wife of Gerard Capes—a son.

Collins.—On April 15, at R.A.F. Hospital, Wegberg, Germany, to Pamela (*née* Barker), wife of Sqn. Ldr. W. R. Collins—a son.

De Salis.—On March 27, 1959, at Louise Margaret Hospital, Aldershot, to Jane (*née* Sears), wife of Flt. Lt. Peter De Salis—a daughter.

Geffryes.—On April 16, at Sleaford, to Maureen (*née* Snaith), wife of Flt. Lt. S. D. Geffryes, R.A.F.—a son.

Jacobs.—On April 15, at R.A.F. Hospital, Halton, to Vera, wife of Sqn. Ldr. H. E. Jacobs—a son.

O'Connor.—On April 10, at R.A.F. Hospital, Nocton Hall, to Ruth, wife of Wg. Cdr. Ivan O'Connor—a son.

Stuart-White.—On April 13, at Calshot, to Jennifer, wife of Flt. Lt. Stuart-White—a son.

DEATH

Satchell.—On March 28, at Little Rissington, Sqn. Ldr. James Satchell, A.F.R.Ae.S., R.A.F.

New Patents

APPLICATION ACCEPTED

814,615.—Fairey Aviation Co., Ltd.—"Multiple indicators."—Jan. 8, 1957 (Jan. 9, 1956).

Application open to inspection on June 10, 1959; opposition period expires on Sept. 10, 1959.

AN EXCITING STEP FORWARD IN BRITISH AVIATION

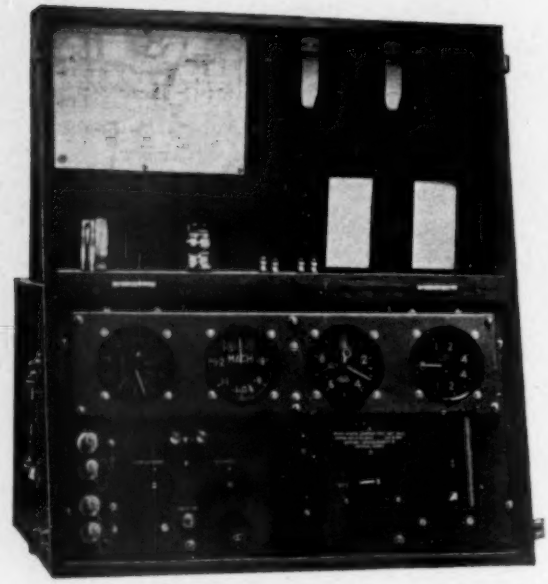
The completion of Britain's first heliport at Battersea by Westland Aircraft Limited is an encouraging step towards providing London with the benefits of helicopter transportation. As suppliers of aviation fuels for all types of Westland helicopters, Shell is proud to be associated with this project.

YOU CAN BE SURE OF SHELL

SHELL

PITOT/STATIC SYSTEM TEST SET

(Cat. No. 1807)



A portable self-contained test set to carry out *in situ* functional testing of direct and remote reading instruments of the Pitot/Static Systems and leak-testing of the complete system.

For further details write to:

BRYANS AEROQUIPMENT LIMITED

Specialists in precision measurement of pressure, temperature and speed. Design and production facilities available for test equipment and multiple panel building, including electrical and electronic work.

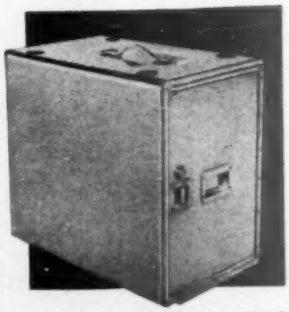
WILLOW LANE · MITCHAM JUNCTION · SURREY · ENGLAND · TELEPHONE: MITCHAM 5134 (5 lines)

MALLITE

GALLEY EQUIPMENT

Meal Tray Boxes, Bar Boxes and Equipment Boxes

Lighter, Cleaner, Stronger and more rigid than Sheet Metal



TYPE I MEAL BOX

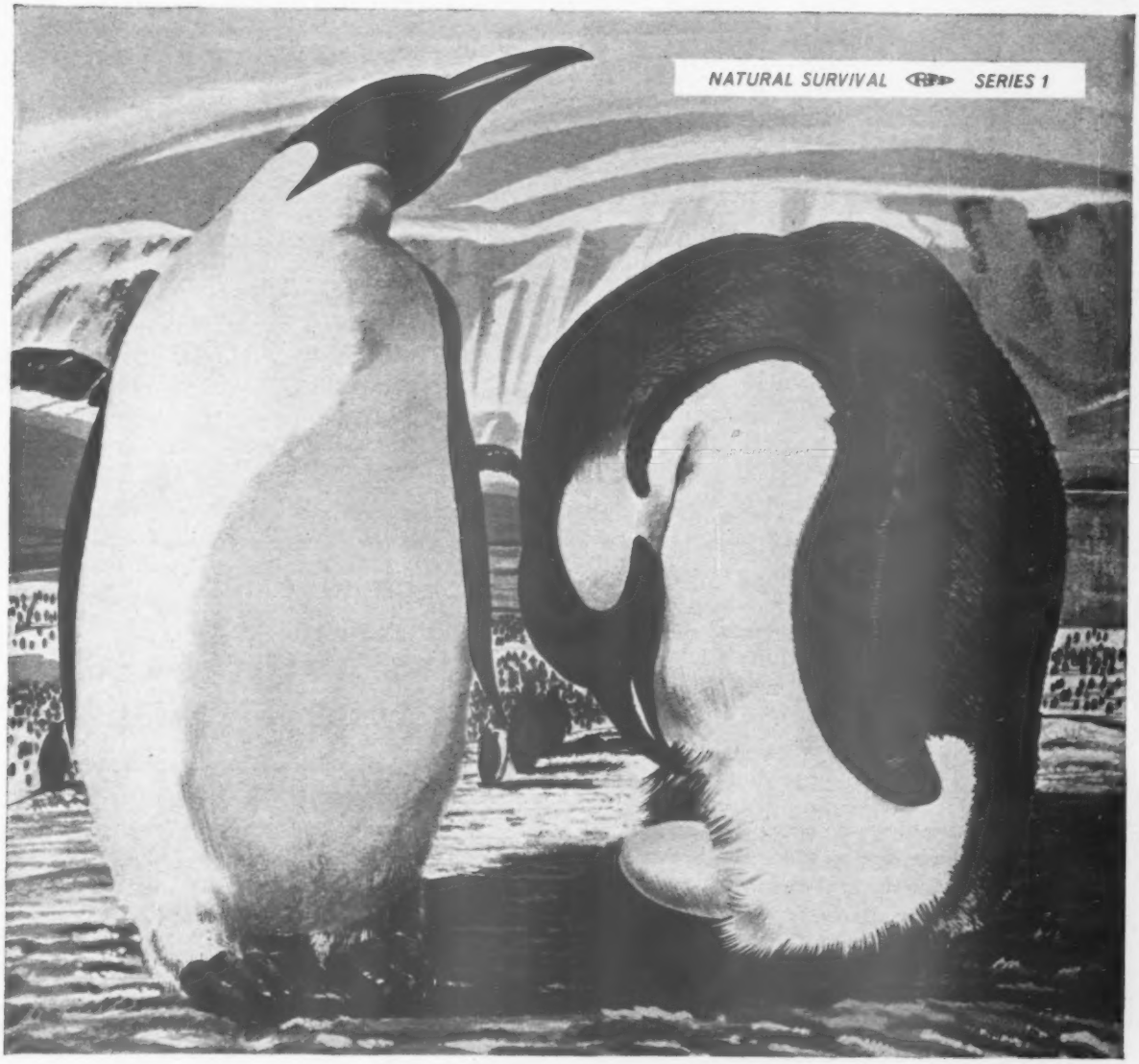
Designed to take 6 or 8 trays of 11" width and to fit a galley installation measuring 11¼" x 17⅞" x 18¼". Constructed from MALLITE EGB.4. which has given many years of service as an aircraft floor taking direct seat loads.

William Mallinson and Sons Ltd.

130 HACKNEY ROAD · LONDON · E.2

Telephone Shoreditch 7654 Telegrams 'Almoner' London

MANUFACTURERS OF PLYWOOD · ARMOURPLY · PANELS AND AIRCRAFT LAMINATES



The Emperor HAS THE EGG AT HIS FEET

Survival in ice-bound Antarctica presents a challenge to *Aptenodytes forsteri* — the Emperor penguin. Immobility and conservation of body heat is their first line of defence against the intense cold. But breeding is the big problem. Without even the sparsest vegetation, even pebbles, available to their more Northerly cousins, a new-laid egg could quickly become a 'frozen' asset. So the female, as soon as she lays her egg, rests it off the ice on her feet, snugly wrapped in a pouch of skin. Twenty-four hours later she transfers this duty to her mate and sets off across the pack ice to the sea, some 125 miles away. There she feeds and feeds, and, fat and full, she returns two months later exactly, just before the chick is hatched. Now it's the mate's turn to go and feed — and it's turn and turn-about until young Emperor is old enough to fend for himself.

Appropriately, survival and protection from exposure under similar conditions is but one of the problems encountered, and largely overcome, by R.F.D. in their inflatable liferafts. A matter of particular significance to airlines exploring the polar routes.

R.F.D COMPANY LTD

AIR/SEA SURVIVAL

INFLATABLE LIFERAFTS, LIFEJACKETS AND OTHER AERONAUTICAL EQUIPMENT

R.F.D. COMPANY LIMITED · GODALMING · SURREY · TELEPHONE: GODALMING 1441

ARB and MOS Design Approved

Also in N. Ireland, Australia, Canada, Africa, Holland, Sweden, France, Denmark, Germany.

THE FOLLOWING AIRCRAFT

now or shortly to be surplus to the Group's fleet requirements, are offered for sale:

2 Viscount 736 Series. These aircraft have been completely overhauled and refurbished. The interiors have been modified for a variety of configurations, including high density with a capacity for 60 passengers. These aircraft are offered either individually or together with a substantial Spare Parts holding.

3 Hermes completely equipped, 65 seats fitted, together with a wide range of Spare Parts and Equipment. The aircraft are offered at £10,000 each.

2 Dakota Mark VI. These are the Transair Dakmasters modified to the Mark VI standards. These aircraft will be of particular interest to Operators who are likely to be penalised by the introduction of Wat Curve Limitations. Prices from £28,500.

4 Viking Mark IB offered in 'as is' condition at £5000 per aircraft. A large stock of Viking Spare Parts is available.

All enquiries to:

AIRCRAFT SALES DIVISION,
AIRWORK LIMITED,
35 PICCADILLY, LONDON W1.

CRC.2

AVIATION TRADERS (ENG.) LTD.

Have vacancies in their Aircraft Design Office at Southend-on-Sea for

SENIOR & INTERMEDIATE STRESSMEN
STRUCTURAL & ELECTRICAL DRAUGHTSMEN

Applications stating age, experience, training, and salary required should be addressed to

CHIEF DESIGNER,
AVIATION TRADERS (ENG.) LTD.
MUNICIPAL AIRPORT, SOUTHEND-ON-SEA, ESSEX

Aircraft Furnishing
• PASSENGER & CREW SEATING
• UPHOLSTERY & LOOSE COVERS
• FOAM RUBBER & MOULDED HAIR FILLINGS
• FLOOR COVERINGS—TEXTILE EQUIPMENT
• "KARGO-PAK" FREIGHT CONTAINER
• PASSENGER SAFETY BELTS
Repairs & Renovations
LATEX UPHOLSTERY LTD.
THE LEADING SPECIALISTS
41, LONSDALE ROAD, LONDON, W.11
TELEPHONE BAYSWATER 6262/3

Congratulations to

BLACKBURN AIRCRAFT LTD

on their 50th Anniversary

WARD, BROOKE & CO LTD
HIGH WYCOMBE, BUCKS

MANUFACTURERS OF TERMINAL BLOCKS AND MISCELLANEOUS PLASTIC ITEMS FOR AIRCRAFT

THE AEROPLANE and ASTRONAUTICS CLASSIFIED ADVERTISEMENTS

PRESS DAY: First Post, THURSDAY

RATE: 10d. per word (minimum 12 words 10/-).

AIRCRAFT FOR SALE

W. S. SHACKLETON, LTD.,
EUROPE'S LEADING AIRCRAFT BROKERS.

It is always pleasant to sell an aeroplane, no matter how small or large, and it is an even greater pleasure when the type concerned is different from any others we have sold.

On this occasion, Sir Robert McAlpine and Sons, Ltd., are the customer and the Piaggio P.166 is the aeroplane. It was accepted by their chief pilot, Captain R. Young, and his engineer, Mr. S. Webster, at Finale in Italy, and then flown back to the United Kingdom only a few days ago.

It will be based at Luton with other executive aircraft of the McAlpine fleet, and incidentally a comprehensive airframe and engine spares holding will be held by the McAlpine Aviation Division at Luton to ensure that they and other Piaggio operators in England have prompt spares backing at all times.

The P.166, which is a really delightful twin-engined executive aeroplane, raises our total to

146 DIFFERENT TYPES OF AIRCRAFT.

It is this background of experience which helps us to help you.

W. S. SHACKLETON, LTD.,
175 PICCADILLY, LONDON, W.1.
Phone, Hyde Park 2448-9.
Cables, "Shackhud, London." 487-9

PIAGGIO EXECUTIVES.

THE 6-8-SEATER P.166, THE P.136-L AMPHIBIAN AND THE AEROBATIC P.149-D CAN BE IMPORTED ON AN OPEN GENERAL LICENCE WITHOUT DOLLAR WORRIES. ASK YOUR DEALER, OR WRITE

AERO-ENTERPRISES (BOREHAM WOOD), LTD.,
17 DRAYTON ROAD, BOREHAM WOOD, HERTS. zzz-19

VENDAIR (LONDON), LTD.,
CROYDON AIRPORT.
Cro 5777.

TIGER MOTH G-APIP.
ENGINE 300 HRS., ELECT. INTERCOM., TOWING HOOK, NEW C. OF A.
PRICE £750.

PROCTOR III G-ALJF.
ISSUE C. OF A., QUEEN II 240 HRS., FOUR SEATS, DUAL CONTROL, NEW WINDSCREENS.
£700.

GEMINI G-AJWE.
CIRRUS II ENGINE 350-550 HRS., RADIO, LARGE CAPACITY GENERATOR, AIRFRAME 1,200 HRS. SINCE NEW.
£1,800.

ALL AIRCRAFT CARRY
VENDAIR GUARANTEE.
VENDAIR, CROYDON 5777. 487-11

ROLLASONS for Tiger Moths. Croydon 5151. zzz-657

TRAVELAIR, LTD.,
AIRCRAFT SALES AND FINANCING SPECIALISTS.

BRISTOL TYPE 170 Mark 21 and 31. We are appointed to effect the disposal of a large number of these aircraft which provide for a payload plus fuel, of well over 7 tons (Mark 31). Favourable terms can be negotiated, especially for "package deals."

DOUGLAS DC6. We have also been appointed to effect the sale of this passenger aircraft which can be sold in (time expired) condition or nil hours since major overall with increased gross take-off weight and interior refurnished to purchaser's requirements, all offers considered.

DOVE 2B, built 1953, low engine hours, dual V.H.F., A.D.F., I.L.S., de-icing, new C. of A., all mods., £12,500. Best value on market.

RAPIDE, very low engine and airframe hours, new C. of A., V.H.F., radio compass, excellent condition, all offers considered.

AND FOR THE PRIVATE AND BUSINESS PILOT.

MOONEY Mark 20, new aircraft available for early delivery to U.K., duty paid, £6,850.

AUSTER Lycoming engine, low airframe and engine hours V.H.F., B.F. panel, L.R. tank, three years' C. of A., attractive price.

CHIPMUNKS. Several available from £1,355.

PROCTORS. Several available.

H.P. Terms gladly arranged, and for full details contact:—
TRAVELAIR, LTD., 115 Oxford St., London, W.1.
Phone, Gerrard 3382. 487-14

DERBY AVIATION LTD
AIRCRAFT & ENGINE OVERHAULS
SALES — SERVICE — TUITION
SCHEDULED AND CHARTER OPERATORS
DERBY AIRPORT
Telephone: ETWALL 333

At last we are able to supply Britain's most sought-after light aero engine

THE GIPSY MAJOR 10/2

with nil-hours since overhaul and in transportation case, at £595 each, whilst we still have a few remaining

GIPSY QUEEN 70/4s

also with nil-hours and in cases, at £795 each.

All offers are ex our Derby works.

LONDON OFFICE Tel: ABBey 2445
78 BUCKINGHAM GATE, S.W.1

For Narco and ARC radio equipment
Sole Distributors in Gt. Britain & Ireland

I.A.C.

62 Merrion Square, Dublin. Phone 62791

THE BRITISH AIRLINE PILOTS ASSOCIATION
95, Mount Street, W.1 Tel.: GROsvenor 6261

Membership open to all Commercial and Service Pilots. For full details as to Objects and particulars of Membership, please write to General Secretary.

E. D. WYNN & CO.
(AIRCRAFT) LTD.

AIRCRAFT INSTRUM.&NTS AND ELECTRICAL ACCESSORIES

Staverton Aerodrome, Gloucester
Telephone: CHURCHDOWN 3264

B. S. T. AERONAUTICAL
A.R.B. APPROVED CO., LTD.

C47 - DC3 Specialists

1. Starters, Generators, Tacho-Generators
2. Hydraulic, Vacuum, Fuel Pumps
3. Undercarriage Bolts and Bushes
4. Flight and Engine Instruments
5. A.N. Materials
6. Wheel and Brake Spares
7. Anti-drag Rings and Spares

BLACKBUSHE AIRPORT, CAMBERLEY
SURREY TELEPHONE CAMBERLEY (CAM 1000 EXT. 11 & 12)

R. K. DUNDAS, LTD.
CLEARANCE SALE!

THREE Rapides, £1,150, £1,650, £1,980. Rather tatty, but good value.

TWO Proctor IVs. A bit clapped, but look at the price. Radio, full C. of A., only £495 each.

ONE Bristol Sycamore. Shining, but sad about its little use. Nothing to beat its price, though.

ONE Chipmunk M22. Very proud of itself, NIL hours througout, fully equipped, only £1,800.

ONE Consul. MR80 V.H.F., Bendix radio compass, fan marker receiver, full C. of A., very smart. It breaks our heart to say only £1,600.

ONE WIDGEON. Out of water, and waiting to get back in. Will someone help by making an offer?

TWO Heron 2s. Raring to go, being only three years old. Full airline radio, the lot, including the kitchen sink, C. of A., £29,500 each.

WE could go on like this but why not give us a ring or call:—

R. K. DUNDAS, LTD., Dundas House, 59 Saint James's St., London, S.W.1. Phone, Hyde Park 3717. Cables, "Dunduk, Piccy, London." 487-8

GRUMMAN Widgeon VP-KNV amphibian, six seats, Queen II engines, D.H. propeller, full blind-flying panel, V.H.F. and M.F., R/T excellent condition, two years' spares available, fly away, Croydon. A. J. Whittemore (Aeradio), Ltd., Croydon Airport, Surrey. zzz-682

Aircraft Wanted

WANTED, TIGER MOTHS with or without aerial spraying equipment, with or without C. of A. Box A874, care of THE AEROPLANE AND ASTRONAUTICS. 487-6

AIRCRAFT ACCESSORIES, SPARES AND COMPONENTS

COMPONENTS, spares and instruments for all aircraft and engines. A.R.B. released. Airtrade, Ltd., Croydon Airport. Phone, Croydon 0643. zzz-691

ROLLASONS are specialists in the overhaul of all Gipsy engines. Croydon 5151. zzz-659

PHILLIPS AND WHITE, LTD.

OFFER from stock a comprehensive range of new spares and components for the following engines: CHEETAH IX, X and XV, de Havilland Gipsy, Major and Queen series.

INSTRUMENTS and instrument parts, navigational equipment, electrical components and aircraft spares are also available from stock.

61 QUEENS GARDENS, London, W.2. Phone, Ambassador 0651, 2764. Cables, "Gyrair, London." zzz-670

THE REGIONAL AIR TRADING CO., Croydon Airport for Rapide spares of every description. Phone, Croydon 8521. zzz-663

ROLLASONS for Tiger Moth and Gipsy engine spares. Croydon 5151. zzz-658

REPAIRCRAFT SERVICES, The Common, Cranleigh, Surrey. Cranleigh 536. Instruments and Autopilot overhaul test sales, Dakota and most other instruments from stock. zzz-701

AIRFRAME spares for Dakotas, Harvards, Piper Cub, Fairchilds, Argus, Beechcraft, D-178 Mosquito, Spitfire, Firefly. Engine spares for Pratt & Whitney, Armstrong Siddeley, Lycoming, etc., accessories and instruments for all types of aircraft. A. J. WALTER, LTD., The Drive, Horley, Surrey. Phone, Horley 1420 and 4294. Cables, "Cubeng, London." 487-12

HELICOPTERS

HELICOPTER SERVICES, LTD., offer their aircraft for all charter services. 96 Piccadilly, London, W.1. Gro 5495-6. zzz-706

HELICOPTERS charter, U.K. and overseas. Autair, Ltd., 75 Wigmore St., London, W.1. Welbeck 1131. 487-688

APPOINTMENTS BUREAUX

DC-4 Captains and first officers required. Also vacancies for A and C Licensed engineers. PLANAVIA International Aeronautical Appointments Bureau, 338 Kilburn High Rd., N.W.6. Mal 3142. 487-15

CLOTHING

R.A.F. Officers' uniforms for sale, new and reconditioned. Fisher's, 86-88 Wellington St., Woolwich. Phone 1055. zzz-672

CONSULTANTS

R. W. SUTTON (CONSULTANTS), LTD., 7 Lansdown Place, Cheltenham. Phone 5811. 495-8824

R. H. STOCKEN, F.R.Ae.S., Eagle House, 109 Jermyn St., S.W.1. Whitehall 8863. zzz-696

ENGINES AND ENGINE SPARES

GIPSY MAJOR Mk. 10 and Mk. 1 engines, part-exchange offered with your time-expired engine; propellers for most types of light aircraft. Mitchell Aircraft, Ltd., The Airport, Portsmouth. Phone 717641. zzz-689

PRATT & WHITNEY. Engine spares for sale. For further particulars write Box A966, care of THE AEROPLANE AND ASTRONAUTICS. 487-x6704

HIRE AND CHARTER

RAPIDES for hire or charter. A. J. Whittemore (Aeradio), Ltd., Croydon Airport, Surrey. zzz-683

BRISTOL 170 Wayfarer for Barthull Charter, passenger or freight, fitted 48 seats. Long term preferred. Apply Shortcut Aviation, Ltd., Godstone Rd., Whyteleafe, Surrey. Phone 8211. 487-10

MACHINERY, TOOLS AND PLANT

CRANE: 6-ton Coles mobile diesel-edectric crane for sale, in new condition. Burnaston Engineering Co., Ltd., Burnaston, Derbys. Phone, Etwall 451. 487-8830

NOTICES

AIR TRANSPORT ADVISORY COUNCIL.

THE AIR TRANSPORT ADVISORY COUNCIL give notice that they have received the undermentioned application for a scheduled service:—

FROM BRITISH OVERSEAS AIRWAYS CORPORATION OF LONDON AIRPORT, HOUNSLOW, MIDDLESEX:—

APPLICATION NO. 2525 for an All Freight Service with Hermes, Constellation 749A or Britannia aircraft on the route London Airport-Dusseldorf (opt.)-Frankfurt-Zurich (opt.)-Rome (opt.)-Brindisi (opt.)-Istanbul-Nicosia (opt.)-Beirut (opt.)-Damascus (opt.)-Cairo (opt.)-Basra (opt.)-Abadan (opt.)-Kuwait (opt.)-Bahrein - Baghdad (opt.) - Teheran (opt.) - Karachi - Bombay (opt.)-Colombo (opt.)-Delhi (opt.)-Calcutta (opt.)-Dacca (opt.)-Rangoon-Bangkok-Hong Kong and/or Tokyo at an initial frequency of one to two return flights weekly increasing later in accordance with traffic demand for seven years from June 1, 1959.

This application will be considered by the Council under the Terms of Reference issued to them by the Minister of Civil Aviation on July 30, 1952. Any representations or objections with regard to this application must be made in writing stating the reasons and must reach the Council within 14 days of the date of this advertisement, addressed to the Secretary, Air Transport Advisory Council, 3 Dean's Yard, London, S.W.1, from whom further details of the application may be obtained. When an objection is made to an application by another air transport company on the grounds that they are applying to operate the route or part of route in question, their application, if not already submitted to the Council, should reach them within the period allowed for the making or representations or objections. 487-3

PACKING AND SHIPPING

R. AND J. PARK, LTD., 143-9 Fenchurch St., E.C.3. Phone, Mansion House 3089. Official packers and shippers to the aircraft industry. zzz-674

PHOTOGRAPHY

NEW American and British cameras, all types, also spares. G.S.A.P. gun cameras. E.W.S. Co., 69 Church Rd., Moseley, Birmingham. 487-8806

RADIO AND RADAR

SPERRY Zero reader, Type ZLI course selectors, control panels, flight computers and indicators, three complete installations in stock. A. J. Whittemore (Aeradio), Ltd., Croydon Airport, Surrey. zzz-684

STR12D, STR9Z, STR9X and most other British and American V.H.F. R/T equipment always in stock. A.R.B.-approved design installations into any type of aircraft. A. J. Whittemore (Aeradio), Ltd., Croydon Airport, Surrey. zzz-685

SITUATIONS VACANT

A.F.R.Ae.S., A.R.B.Certs., A.M.I.Mech.E., etc., on "No pass, no fee" terms. Over 95% successes. For details of exams. and courses in all branches of aeronautical work, aero engines, mechanical engineering, etc., write for 148-page handbook—free B.I.E.T. (Dept. 703), 29 Wright's Lane, London, W.8. zzz-690

EXPERIENCED helicopter pilot required May to August for U.K. crop spraying season. Minimum qualifications 1,000 hours in command helicopters and Commercial Licence. Please reply to Box A873, care of THE AEROPLANE AND ASTRONAUTICS. 487-5

ENGINEER required for service in West Africa, preferably with A and/or C licence on Beaver aircraft and R.985 engines. Salary according to qualifications with generous allowances. Married accommodation immediately available. Write Box A 131, LPE, Romano House, 399-401 Strand, London, W.C.2. 488-8833

OVERSEAS AVIATION (C.I.) LTD.

Have Available For World-Wide Charter

65 Seater Argonaut A/C

Payload 6,000 Kilos

Fully Pressurised

Also 36 Seater Vikings

FOR DETAILS PLEASE APPLY

U.K. SALES OFFICE:

PANTON HOUSE, 25 HAYMARKET, LONDON, S.W.1.

Tel: Trafalgar 3901/2 Telex: 21168 (Overseas Ldn.)

ADCOLA (Regd. Trade Mark)

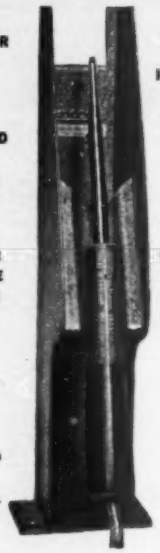
SOLDERING EQUIPMENT

THE ELECTRONIC INDUSTRIES SOLDERING TOOL FOR THE TRANSISTOR AGE

MANUFACTURED IN ALL VOLT RANGES

DESIGNED FOR CONTINUAL USE ON BENCHLINE ASSEMBLY

British & Foreign Patents Reg. Designs etc.



ILLUSTRATED ¼" Bit Model (Cat: No. 70)

PROTECTING SHIELD (Cat: No. 68)

Catalogues from Head Office, Sales & Service

ADCOLA PRODUCTS LTD.

GAUDEN ROAD, CLAPHAM HIGH STREET, LONDON SW4

Telephones: MACaulay 3101 & 4272

GUARANTEED R.L.A.

LAMINATED ALUMINIUM

USED ON MOST IMPORTANT AIRCRAFT

A.I.D. & A.R.B.

B. ATTEWELL & SONS LTD.

IVER BUCKINGHAMSHIRE

NEW BALL & ROLLER BEARINGS

Over 5,000,000 in stock in more than 5,000 types

BRITAIN'S LARGEST STOCKS

WRITE FOR STOCK LISTS

CLAUDE RYE BEARINGS

895-921, FULHAM RD., LONDON, S.W.6

Phone: RENOWN 6174 (EXT. 24) TELEX 23453

Southend Municipal Flying School

Commercial and Private Pilot's Licence. Instructors Rating. Night Flying every night. No entrance fee or subscription.

Austers £4 5s., Chipmunks £5 5s., dual or solo. Contract rate £3 15s.

Municipal Airport, Southend-on-Sea, Essex

Phone: Rochford 56204

AIRCRAFT SPRING WASHERS

To B.S. SPECIFICATION 2 SP.47.

CROSS MFG. CO. (1938) LTD. COMBE DOWN, BATH.

COMMERCIAL pilot required for permanent position with firm engaged in crop spraying, pleasure flights, charter and instruction. Instructor with Home Command approval preferred. Full details of experience to Lincs Aerial Spraying Co., Boston Aerodrome, Lincs. 488-8835

INSTITUTO TECNOLOGICO DE AERONAUTICA.

SAO JOSE DOS CAMPOS, SAO PAULO, BRASIL.

APPLICATIONS are invited from aeronautical engineers with considerable experience in experimental stress analysis and instrumention to fill a position in the Structures Department of the above Institute. Appointment will be as Assistant or Associate Professor. Duties include teaching, research and consultant work for industry. Full details of age, nationality, number of dependants, education, experience, publications, inexpensive photograph, etc., should be sent by air mail to Rector S. S. Steinberg. The names of three referees are required. Contracts are normally for four years with first-class passage both ways. Liberal salaries in local and foreign currency, tax free, furnished houses and other advantages. 487-7

A-LICENCE radio engineer required; good salary. Apply, Chief Engineer, Morton Engineering Services, Ltd., Croydon Airport, Surrey. 487-13

SITUATIONS WANTED

COMMERCIAL Pilot, 6,000 hours, Dove, Rapide, Auster, charter or pleasure flying. Box A864, care of THE AEROPLANE AND ASTRONAUTICS. 488-xB6702

PUBLIC relations post in aircraft, airline or associated industry, sought by aeronautical free-lance writer and public lecturer with A.I.T.P., 11,000 hours, and ability to interpret aviation to the unconverted. Box A972, care of THE AEROPLANE AND ASTRONAUTICS. 487-x6826

PATENTS officer/librarian with five years' experience of patents and aeronautical engineering (engines) background, requires a position in the aircraft industry. Box A871, care of THE AEROPLANE AND ASTRONAUTICS. 487-x6825

AGRICULTURAL Pilot, Auster, Piper Cub, Tiger Moth, U.K. or overseas. Box A865, care of THE AEROPLANE AND ASTRONAUTICS. 488-xA6702

TUITION

AIRWAYS AERO ASSOCIATIONS, LTD., Croydon Airport, M.T.C.A.-approved P.P.L., C.P.L. I/R courses. Fully equipped Chipmunk, Auster, Proctor and twin-engined aircraft. Link £1 per hour. Specialist instruction. Competitive and contract rates. Phone, Croydon 9308. zzz-699

LONDON SCHOOL OF AIR NAVIGATION.

MINISTRY Approved for Commercial and Instrument Rating. Subjects for all professional licences and ratings embracing academic, technical, simulated and flying; home-study excellent alternative, individual coaching; refresher courses; officially appointed by H.M. Services for Correspnodence Scheme, Refer Education Officer or direct 33 Ovington Square, Knightsbridge, London, S.W.3. Kensington 8231. zzz-697

CIVIL pilot-navigator licences.

AVIGATION, LTD., provide full-time or postal tuition or a combination of either of these methods to suit individual requirements for the above licences. Classroom instruction can be provided for A.R.B. General, certain specific types and performance schedule examination. Link Training Depot., at Monarch 1364.

FOR full details apply to the Principal.

AVIGATION, LTD.,
30 CENTRAL CHAMBERS,
EALING BROADWAY,
LONDON, W.5.
Phone, Ealing 8948. zzz-669

TWIN-ENGINE conversions for your instrument rating or for private pilots. Generous deferred-payment facilities. Derby Aviation, Ltd., Elstree Aerodrome, Herts. Phone, Elstree 3070. 487-8831

INTERNATIONAL AERADIO LIMITED

M.T.C.A. Approved

SCHOOL OF AIR TRAFFIC CONTROL

at Southall, Middlesex

●

AERODROME AND APPROACH CONTROL TRAINING COURSE

commencing 8th June, 1959 for 8 weeks

●

A limited number of vacancies are offered to suitable candidates *Up to M.T.C.A. Certification Standard*

For further details apply to:

40 PARK ST., LONDON, W.1

LEARN to fly, £32; instructors' licences and instrument flying for £3 15s. per hour; night flying, £4 15s. per hour Residence 6 gns. weekly. Approved M.T.C.A. Private Pilots' Licence Course. Specialized course for Commercial Pilot's Licence. Wiltshire School of Flying, Ltd., Thruxton Aerodrome (Andover Junction 1 mr. 15 min. from Waterloo), Hants. zzz-700

CAMBRIDGE AERO CLUB. M.T.C.A.-approved private pilot's licence course, 30 hours £3 10s. per hour; D.4 Link Trainer for radio compass and I.L.S. procedures to instrument rating standard, £1 per hour; instructor's course, £3 10s. per hour; night flying, £4 10s. per hour; Auster J.1.N. £3 15s. per hour, dual and solo. No fees or subscriptions. Club operates on all days, including week-ends. The Aerodrome, Newmarket Rd., Cambridge. Phone 56291. zzz-703

THE COLLEGE OF AERONAUTICS.
A SHORT COURSE ON
CIVIL AIRCRAFT AERODYNAMIC ASSESSMENT
WILL BE HELD FROM
MONDAY, NOVEMBER 2,
TO
FRIDAY, DECEMBER 11, 1959.

The course is intended for students having a general aeronautical background and preferably a thorough knowledge of elementary calculus but not necessarily of mathematics, up to degree level.

The subjects to be covered will include the basic principles of aerodynamics and modern methods of performance and stability control analysis.

The weekly programme will consist of 12 lectures, two tutorials, one laboratory experiment, one seminar and either a visit to one of the civil aircraft manufacturing firms or a flight test illustrating stability characteristics and special performance techniques for turbo-jet aircraft.

The charge for tuition, including Flight Tests and board and residence for the complete course is £200. Further information and forms of application may be obtained from The Warden, The College of Aeronautics, Cranfield, Bletchley, Bucks. 487-8832

EXETER AIRPORT, LTD. Courses for Commercial Pilot's Licence, from £625; Private Pilot's Licence, from £101 5s. Contract rate solo flying. Austers and Tigers £2 17s. 6d. per hr.; normal dual/solo rates, £3 7s. 6d. per hr; twin conversions, £6 12s. per hr.; Chipmunk, £5 5s. per hr.; Messenger, £4 18s. 6d. per hr. Limited accommodation, £5 15s. 6d. per week. Exeter Airport, Exeter. Phone 67433. zzz-705

PLYMOUTH. Ideal training area in holiday district for commercial and P.P.L. training. Tiger and Auster £3 7s. 6d. per hour. Contract rate £2 17s. 6d. solo. Chipmunk for advanced flying £5 5s. Night flying available. Individual tuition with guided study. Plymouth Airport, Ltd., Crownhill, Plymouth 72752. zzz-0704

MORLEY AVIATION, LTD. (Herts and Essex Aero Club, 1958). Aerodrome, Stapleford. M.C.A.-approved private pilot's licence course, Auster, Gemini and Tiger aircraft; trial lesson 35s.; 15 miles centre of London. Central Line Underground to Theydon Bois, bus 250 to club; open every day. Phone, Stapleford 257. 487-695

DO you live in the Midlands? Then learn to fly at Derby Airport. Trial lesson 45s. Phone, Etwall 323, or contact the manager, Derby Air Centre, Burnaston Airport, Derby. 487-2

AIRWORK SCHOOL OF AVIATION PERTH.
M.T.C.A.-APPROVED courses for private and commercial licences and instrument rating; residential and recreational facilities. Prospectus from Airwork Services, Ltd., 35 Piccadilly, London, W.1, or Perth Aerodrome, Scotland. 487-4

LINK instruction to instrument rating standard. D4 available at 25s. per hour at Biggin Hill. Maitland Air Charters, Ltd. Phone, Biggin Hill 2277. 490-8834

CLUB NOTICES, ETC.

SURREY AND KENT FLYING CLUB, Biggin Hill. Tiger, Hornet and Leopard Moths, Chipmunk and Prentice. Green Line 705 direct in one hour from London. Biggin Hill 2255. 487-0694

DO you live in the Midlands? Then learn to fly at Derby Airport. Trial lesson 45s. Phone, Etwall 323, or contact the Manager, Derby Air Centre, Burnaston Airport, Derby. 487-1

INSTRUMENTATION ENGINEERS

Applications are invited for
TWO INSTRUMENTATION ENGINEERS
to work at
PARK STREET, near ST. ALBANS.

The work will involve calibration and setting up of S.F.I.M., C.I.D., and F and E trace recorders and associated transducers and also aircraft flight instruments.

Applicants should preferably have as a minimum qualification Ordinary National Certificate and previous experience of this work.

Please write giving full details to:
STAFF OFFICER
HANDLEY PAGE LIMITED
CRICKLEWOOD · LONDON · N.W.2

OPPORTUNITY IN A GREAT YOUNG COUNTRY
ROYAL RHODESIAN AIR FORCE

has immediate vacancies for ex-R.A.F. men, single (or married without children), not over 30, recently released and QUALIFIED in the following trades:

AIRFRAME FITTER · ARMAMENT FITTER · ENGINE FITTER
INSTRUMENT FITTER · RADIO FITTER · AIR WIRELESS FITTER
AIR RADAR FITTER · ELECTRICAL FITTER · GROUND WIRELESS FITTER
SAFETY EQUIPMENT WORKER

FULL CAREER PROSPECTS · FINE CONDITIONS · GOOD PAY & PENSIONS

An ideal Service life in a good climate with all-the-year-round sunshine.

Apply, stating age (married or single), Service Qualifications and experience:—
Air Liaison Officer, 429 Strand, London, W.C.2

ROLLS-ROYCE

SPADEADAM
ROCKET ESTABLISHMENT
has vacancies for
TECHNICAL ASSISTANTS
and for
TEST ENGINEERS

to work on all aspects of Rocket Engine Testing at their Rocket Engine Testing Establishment at Spadeadam in Cumberland. Successful applicants may be required to spend a short period of training in the South of England prior to permanent transfer to Spadeadam.

Applicants, who should be in the age group 21/35, must have preferably attained the O.N.C. or H.N.C. standard of qualification and have had experience of engine test work, but a well qualified man without this type of experience will be considered.

Housing assistance may be available in certain cases after an initial waiting period. Salaries will be in accordance with age, qualifications and experience.

Applications should be made in writing to:
EMPLOYMENT OFFICER (Obn),
ROLLS-ROYCE LIMITED,
17/19, HIGH CROSS STREET,
BRAMPTON, CUMBERLAND

Hawker Siddeley
GUIDED WEAPONS DIVISION

A Design Office is being formed at
KINGSTON, SURREY
to carry out the design of a new Air Launched Strategic Guided Missile. This is a major Guided Weapon Project and must be developed with all possible speed. There are immediate openings for:

DESIGN DRAUGHTSMEN,
STRESSMEN and
WEIGHT CONTROL ENGINEERS
with Aircraft and/or Guided Weapons experience.

This is an opportunity to join a compact team in new premises with every opportunity for further advancement.

The office is located close to Kingston and Richmond Park. A Group Pension Scheme is operated.

Applications should be made to:
Chief Draughtsman,
A. V. ROE & CO. LIMITED
Kingston Design Office,
c/o Hawker Aircraft Ltd.,
Richmond Road, Kingston, Surrey.

SENIOR DESIGN ENGINEERS
required by
BLACKBURN ENGINES LIMITED

Applications are invited for the positions of Senior Designers with extensive knowledge of design and development engineering and with at least 5 years experience on aero and industrial gas turbines.

The work is of a varied and interesting nature and the salary is in accordance with experience and qualifications.

Attractive pension scheme, good working conditions and welfare facilities are offered together with removal expenses.

All applications will be acknowledged and treated in the strictest confidence.

Apply giving full particulars to:
The Design Office Manager,
Blackburn Engines Limited,
Brough, Yorkshire.

WIRE THREAD INSERTS

FOR NEW DESIGNS & SALVAGE
The Cross Wire Thread insert is a coil of wire having a thread form both in the bore and on the outside diameter. It screws into a tapped hole larger than the normal size, has a slight springy interference fit with its mating part and provides a hard smooth thread that will neither come out nor wear out.

CROSS MFG. CO. (1938) LTD.
COMBE DOWN, BATH Tel.: COMBE DOWN 2355/8

BOOKS AND PUBLICATIONS

WORLD'S largest stock of old aviation books (over 15,000). Catalogue free. Top price paid for Janes, any year, World War I and other aviation books. Stuart, Fairlight Hall, Hastings. zzz-681

PRINCIPLES OF HELICOPTER ENGINEERING, by Jacob Shapiro. This comprehensive review of the engineering principles governing the design and construction of helicopters provides a complete survey of present knowledge in the field. Illustrated, 448 pages, 55s. net from booksellers, or 56s. 9d. by post from the publishers, Temple Press Limited, Bowling Green Lane, London, E.C.1. zzz

INTERPLANETARY FLIGHT (3rd Impression), by Arthur C. Clarke. Describes the problems to be solved before space travel becomes a reality and the form rockets and spaceships may take. Illustrated, 169 pages, 9s. 6d. net from booksellers, or 10s. 2d. by post from the publishers, Temple Press Limited, Bowling Green Lane, London, E.C.1. zzz

THE EXPLORATION OF SPACE (First Cheap Edition), by Arthur C. Clarke. Provides answers to the many questions the intelligent layman asks about the science of "astronautics." Over 375,000 copies sold in all editions. Illustrated. 212 pages. 8s. 6d. net from booksellers, or 9s. 5d. by post from the publishers, Temple Press Limited, Bowling Green Lane, London, E.C.1. zzz

THE "POWER AND SPEED" SERIES FOR BOYS. "Aircraft and Air Power" by F. G. Swanborough, of THE AEROPLANE AND ASTRONAUTICS. This new series has been written by specialist authors for intelligent boys between the ages of 10 and 16. In "Aircraft and Air Power" the author surveys modern military flying and includes chapters on combat aircraft, scientific aids and missiles. Other titles in this series are "Motorcars," "Locomotives" and "Ships and Shipbuilding." Illustrated, 112 pages, 10s. 6d. net from booksellers, or 11s. 5d. by post from the publishers, Temple Press Limited, Bowling Green Lane, London, E.C.1. zzz

NEW Names, NEW Appointments, NEW Companies, NEW Groupings are all listed in the NEW 1959 Edition of

THE AEROPLANE DIRECTORY OF BRITISH AVIATION

JUST PUBLISHED—the new, 1959 Edition of '*The Aeroplane*' *Directory of British Aviation* reflects the changing pattern of British Service and Civil Aviation dictated by new Defence policy requirements and altering conditions of commercial aviation. New company alignments, new groupings within the Aircraft Industry, and the many important new appointments which follow in their train, are all recorded in this new edition of the Directory which has been revised throughout.

Every up-to-date office and library requires a copy of this year's '*The Aeroplane*' *Directory*—the indispensable source of reference covering all aspects of aeronautical activity, Service and Civilian, in the United Kingdom and throughout the British Commonwealth.

PRINCIPAL CONTENTS INCLUDE:

SERVICE AVIATION: Senior appointments in the Royal Air Force, at the Air Ministry and in the Commonwealth and NATO Air Forces; principal appointments in the Army and Royal Navy; British and Foreign Air Attachés; Service Air Stations in the U.K.

CIVIL MINISTRIES: Principal appointments in Civil Ministries and Aviation Authorities at home and overseas.

THE AIRCRAFT INDUSTRY: Names of directors and chief executives of companies in British and Commonwealth Industries and 300-page classified directory covering aircraft, guided missile and engine constructors and allied manufacturers.

COMMERCIAL AVIATION: Details of all British and Commonwealth aircraft operating companies, nationalized and independent, with lists of senior executives and aircraft fleets. List of U.K. civil aerodromes.

INTERNATIONAL BODIES, SOCIETIES AND CLUBS: Includes names of principal officers, addresses, and a list of over 240 flying and gliding clubs.

BIOGRAPHICAL SECTION: Containing over 1,650 entries.

Size 8¾ in. x 5¾ in. 646 pages. Linson Boards. Price: **30s. net.** *(postage 1s. 9d.)*

TEMPLE PRESS BOOKS: Bowling Green Lane, London E.C.1

INDEX TO ADVERTISERS

Name	Page
A	
Adcola Products, Ltd.	30
Airwork, Ltd.	28
Attewell, B., & Sons, Ltd.	30
Automotive Products Co., Ltd.	Inside Back Cover
Aviation Traders, Ltd.	28
B	
Blackburn Aircraft, Ltd.	12, 31
Boeing Airplane Co., Ltd.	5
B.P. Aviation Services	14
Bristol Siddeley Engines, Ltd.	Back Cover
British Airline Pilots Association, The	29
British Thomson-Houston Co., Ltd., The	6
Bryans Aeroquipment, Ltd.	26
B.S.T. Aeronautical Co., Ltd.	29
C	
Canadair	18, 19
Cellon, Ltd.	20
Cross Manufacturing Co. (1938), Ltd.	30, 31
D	
De Havilland Aircraft Co., Ltd.	15
Delaney Gallay, Ltd.	17
Derby Aviation, Ltd.	29
E	
Elliott Brothers (London), Ltd.	4
F	
Ferranti, Ltd.	9
Flight Refuelling, Ltd.	16
H	
Handley Page, Ltd.	23, 31
Hawker Siddeley Aviation Ltd. (A. V. Roe & Co., Ltd.)	31
Hendrey Relays, Ltd.	10
Hughes-Johnson Stampings, Ltd., The	8
Hull Gauge & Tool Co., Ltd.	8
Hunting Aircraft, Ltd.	21
Hymatic Engineering Co., Ltd., The	11
I	
International Aeradio, Ltd.	30
Irish Air Charter, Ltd.	29
L	
Latex Upholstery, Ltd.	28
M	
Mallinson, Wm., & Sons, Ltd.	26
N	
Northrop International	3
O	
Overseas Aviation (C.I.), Ltd.	30
R	
R.F.D. Co., Ltd.	27
Rolls-Royce, Ltd.	31
Rotax Ltd.	Front Cover, Inside Front Cover, 1
Royal Rhodesian Air Force	31
Rye, Claude, Ltd.	30
S	
Shell Aviation Services	25
Southend Municipal Flying School	30
Sperry Gyroscope Co., Ltd.	24
Sterling Metals, Ltd.	6
T	
Teleflex Products, Ltd.	10
Thermo Plastics, Ltd.	10
Thorn Electrical Industries, Ltd.	2
U	
United Aircraft Export Corporation	7
V	
Vickers-Armstrongs (Aircraft), Ltd.	13
W	
Ward, Brooke & Co., Ltd.	28
Wynn, E. D. (Aircraft), Ltd.	29

Printed in England and Published Weekly by the Proprietors, TEMPLE PRESS LIMITED, BOWLING GREEN LANE, LONDON, E.C.1.
Registered at the G.P.O. as a Newspaper. Entered as second-class matter at the Post Office at New York, N.Y., under the Act of March 3, 1879 (Sect. 393 P. L. & R.).

AGENTS ABROAD—EUROPE—Messageries Dawson (S.A.), Paris; Messageries Hachette, et Cie, Paris; W. H. Smith & Son, Paris and Brussels. CANADA—Wm. Dawson Subscription Service Ltd., Toronto; Gordon & Gotch Ltd., Toronto. U.S.A.—Eastern News Co., 306 West 11th Street, New York, 14, N.Y. AFRICA—Central News Agency, Ltd., Cape Town; W. Dawson & Son (S.A.), Cape Town. ASIA—W. Thacker & Co., Ltd., P.O. 100 Bombay. AUSTRALIA and NEW ZEALAND—Gordon & Gotch (A'sia), Ltd.

Lockheed undercarriage for the Blackburn Beverley

Congratulations to BLACKBURN on their 50th ANNIVERSARY from LOCKHEED,

who have had the pleasure of supplying hydraulic equipment to Blackburn for a long while

Lockheed

HYDRAULIC AIRCRAFT EQUIPMENT

LOCKHEED PRECISION PRODUCTS LIMITED
LEAMINGTON SPA, WARWICKSHIRE, ENGLAND

NATO
choice
highlights
ORPHEUS
success

ORPHEUS-POWERED FIAT G 91 CHOSEN FOR LARGE SCALE PRODUCTION

As a result of the 1957 Brétigny trials, the Fiat G 91, powered by the 5,000-lb thrust Orpheus 803 turbojet, was unanimously recommended for immediate production as the standard NATO lightweight tactical fighter for the operational squadrons deployed in defence of Europe.

Another Orpheus-powered aircraft, a developed version of the Breguet 1001 Taon which took part in the trials, was recommended as the second generation lightweight tactical fighter. Of the ten design proposals originally submitted to NATO for this role, nine were powered by the Orpheus, which was developed with the support of the US Mutual Weapons Development Team for this purpose.

The Fiat G 91 squadron already in service, is being evaluated by NATO. Orders for large numbers of the aircraft have been placed by Italy, implementing the NATO decision, while Germany, France, Greece and Turkey are expected to follow suit shortly.

Besides large-scale production at Bristol, the Orpheus turbojet is licensed for building in Italy and France for the NATO defence programme, and in addition is being produced in India for the Folland Gnat.

Continued development, many roles

More advanced Orpheus versions are well under way. These are not only being developed to higher powers for advanced strike aircraft and fighters, but are also being specifically developed for trainers and medium-size civil aircraft. The immense future potential of the Orpheus becomes ever more apparent.

Bristol Siddeley

ENGINES LIMITED